HAND BOOK
of
Mining Engineering
Multiple Choice Questions

(Designed for GATE, Competitive Exams & Statutory Exams)

2015 Edition

Editor

Prof. G.K.Pradhans

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Introduction

Mining education and post-education competitive and statutory examination systems have seen significant changes in the recent years. The selection process adopted by corporate and mining companies were mostly 'interview' oriented for many years. Even in DGMS conducted various statutory examinations, it was question paper based system. In view of the changing scenario in the selection process for jobs and also India's march towards 'Digital India' majority of competitive examinations have gone for changes. The recent success achieved by DGMS to hold statutory examinations on on-line mode had also dramatically changed the system of preparations to be taken up by the aspiring candidates.

For any PSU jobs and competitive examinations meant for higher studies GATE, NET etc have also adopted new system. The mode of question papers have gone for more assessing the intellectual abilities of the candidates through multiple choice objective type questions on different subjects.

Several experts have made attempts to bring out books containing multiple type questions related to Mining. In this regard the attempt made by Prof N.C.Dey, Sri H.N.Karmakar, and others is laudable. Several other experts have also compiled multiple type questions and enriched the area, and benefitted the students/examinees to a great extent.

An attempt has been made by the editor of this publication, to bring out this edition to benefit the students, aspiring job applicants and also examinees preparing for the statutory examinations conducted by DGMS.

The editor also take this opportunity to record his thanks for the attempts made by many experts in bringing out this type of publication.

All out efforts have been made to incorporate most major subjects of Mining keeping in view GATE syllabus, syllabus of statutory examinations and question papers of various competitive examinations.

The management of AKS University needs special thanks for publishing this book and providing necessary assistance through the deputation of Sri Ashish Khare and Sri Alok Vishwakarma to assist in the compilation and editing etc. Sri A.Sahoo, Asst. Editor of The Indian Mining & Engineering Journal took special care to ensure its printing at Bhubaneswar. Faculty members attached to the Department of Mining Engineering, AKS University, also extended technical support during the compilation of the book. All their support is duly acknowledged.

We also acknowledge with thanks various informations from DGMS Circulars and web site during the preparation of this volume.

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18th December 2015
Satna

Chapter

Geology

1. **The branch of geology which deals with the study of structure of rocks known as**
   (a) Physical geology (b) Geomorphology
   (c) Structural geology (d) Palaeontology

2. **The branch of geology which deals with description, classification an correlation of strata in sedimentary rock is known as**
   (a) Stratigraphy (b) Sedimentary Petrology
   (c) Physical Geology (d) Igneous Petrology

3. **The theory of origin of the solar system is divided in to two groups which ar**
   (a) Evolutionary and catastrophic (b) nebular and gaseous tidal hypo.
   (c) a and b both (d) none

4. **Nebular hypothesis proposed by**
   (a) Kant and laplace (b) Chemberlein and molten
   (b) jeans and Jeffries (d) none

5. **A vast cloud of hot gas from which different planets are originated is know as**
   (a) Gas cloud (b) nebula (c) star (d) meteorite

6. **The outer surficial layer of the earth crust is called**
   (a) Mantle (b) Core (c) Crust (d) Sial

7. **The crust which is granitic in composition is known as**
   (a) Sial (b) Sima (c) Mohrovisic discontinuity (d) None

8. **The discontinuity which separate the sial and sima layer of the crust is know as**
   (a) Mohrovisic (b) Guttenberg-wichart (c) Repity (d) Conrard

9. **Most authentic method for age determination of earth is**
(a) From salinity of ocean (b) From rate of sedimentation
(c) From rate of cooling of earth (d) Radioactive age dating method

10. **Upper mantle is basically shows**
(a) Basaltic composition (b) Granitic composition
(c) Ultrabasic composition (d) None

11. **On the basis of different method of age determination the age of earth is estimated about**
(a) 4600my (b) 5000 year (c) 100my (d) None

12. **The discontinuity which occurred about 2900 km beneath earth surface is known as**
(a) Mohrovisic (b) Guttenberg-wichart (c) Repitty (d) Conrard

13. **Geology is important for mining engineering because**
(a) The mining activity operated in earth
(b) Rock type decide the method of mining
(c) Mineral occurred in earth
(d) All of above

14. **The theory which suggest that planets are formed during the evolution of the sun are called**
(a) Evolutionary theory (b) Catastrophic theory
(c) Both a and b (d) None of above

15. **The topographic depressions that accommodates lakes are known as**
(a) Crater lakes (b) Aeolian lakes (c) Lake basins (d) Honr-shoe lakes

16. **Glaciers are masses of**
(a) solid mineral (b) earth's crust (c) solid ice (d) frozen dust

17. **The nature of eruption of volcano is principally guided by**
(a) size of conduit (b) physical and chemical character of magma
(c) crater (d) volcanic cones

18. **Seismic shocks that originate due to crustal movements are defined as**
(a) superficial earthquakes (b) tectonic earthquakes
(c) focus earthquakes (d) P-waves

19. **The exact spot underneath the earth's surface at which an earthquake originates is known as**
(a) epicenter (b) focus (c) shake-waves (d) surface waves

20. **The delicate instrument that records earthquakes is known as**
(a) thermometer (b) richter (c) seismographs (d) vibro-scanner

21. **It is an opening of any shape or size which act as avenues for the magma to rise and spread upon earth's surface in the form of lava.**
(a) swamp (b) reef (c) moraine (d) volcano

22. **The mineral deposit in solid rock is called**
(a) ore (b) lode (c) gangue (d) lithology

23. **A natural mineral substance of iron oxide, clay and sometimes manganese is called**
(a) shale (b) silt (c) ochre (d) tuff

24. **It is an important constituent of granite and a chief constituent of sandstone where it occurs as broken form. Its hardness is 7 (seven). Name the mineral.**
(a) magnetite (b) topaz (c) orthoclase (d) quartz

25. **The process of removal of loose soil or rock particles during storm, along the course of the blowing wind is defined as**
(a) attrition (b) deflation (c) denudation (d) mantle

26. **The process of wear and tear of the exposed country rocks is defined as**
(a) attrition (b) abrasion (c) deflation (d) suspension

27. **What is dunes?**
(a) wind-borne particles (b) wind-formed deposits of sand
(c) pedestal rock masses (d) transverse oasis

28. **It is a buff coloured deposit made up of angular fragments of unaltered mineral grains and is characteristically un-stratified. The thickness of such deposit may vary from few inches to hundreds of feet**
(a) run-off (b) fly-off (c) pot-holes (d) loess

29. **It is property by virtue of which it allows water to travel through its pore-spaces or other openings and found to be proportional to the square of the diameter of the grains forming the rock.**
(a) viscosity (b) permeability (c) seepage (d) artesian spring

30. **Underground water emerging on the surface in the form of seepages and springs is found to form loose superficial deposits of silica or calcium carbonates. Such deposits are known as**
(a) sinters (b) karst (c) caverns (d) stylolites

31. **The low-lying lands where the water table has reached the land surface and which commonly occur along food plains of rivers and in low lying sea-shores. Such areas are known as**
(a) lakes (b) swamps (c) basins (d) water table

32. **During which transportation, the organism is decomposed and it loses nitrogen, oxygen and other volatile constituent?**
(a) evolution (b) sedimentation (c) crystallization (d) carbonization

33. **The ratio of volume of voids in a rock or soil to its total volume is known as**
(a) lithology (b) plasticity (c) permeability (d) porosity

34. **It is a compound of $CaCO_3$ and $MgCO_3$ in various proportion**
(a) magnetite (b) laterite (c) siderite (d) dolomite

35. **Which of following is not a mineral**
(a) Olivine (b) Calcite (c) bauxite (d) Quartz

36. **The hardness of corundum is**
(a) 3 (b) 8 (c) 9 (d) 1

37. **Apatite hardness is**
(a) 3 (b) 4 (c) 4.8 (d) 5

38. **Fluorite hardness is**
(a) 3 (b) 4 (c) 4.8 (d) 4

39. **Calcite mineral is belong to**
(a) Silicate (b) Carbonate (c) Sulphate (d) Chloride

40. **The Quartz mineral is belong to**
(a) Silicate (b) Oxide (c) Carbonate (d) None

41. **The streak of Hematite is**
(a) Grey (b) Black (c) Cherry Red (d) Red

42. **The Weak plain found in minerals is known as**
(a) Cleavage (b) Streak (c) lusture (d) None

43. **The Vitreous lusture come under the**
(a) Metallic (b) None metallic (c) Both a and b (d) None

44. **Calcite shows**
(a) One set Cleavage (b) Two set Cleavage (c) Three set Cleavage (d) None

45. **Minerals are**
(a) Inorganic substances (b) Having definite chemical composition
(c) Having fixed atomic structure (d) All of the above

46. **Admantive lusture is shown by**
(a) calcite (b) Felspar (c) Sphelerite (d) diamond

47. **How many cleavage sets are found in Quartz mineral**
(a) One (b) Two (c) Three (d) Absent

48. **When a minerals breaks with curved concavities the fracture surface is know as**
(a) Uneven (b) Even (c) Concoidal (d) Hackly

49. **The chemical composition is Quartz is**
(a) SiO_3 (b) SiO_2 (c) SiO_4 (d) SiO_6

50. **Talc is belonging to**
(a) Monoclinic (b) Orthorhombic (c) Triclinic (d) Hexagonal

51. **Galena is belonging to**
(a) Cubic (b) Orthorhombic (c) Triclinic (d) Hexagonal

52. **Polymorphs of carbon are**
(a) Diamond and Graphite (b) Coal and Petrolium
(c) Cock and Charcole (d) None

53. **Crystallography is a branch of**
(a) Geology (b) Mineralogy (c) Physical Geology (d) both a and b

54. **The polarizer is situated**
(a) Below the stage (b) Above the stage (c) With the stage (d) None

55. **A part of any stream or rock that is exposed at the surface is known as**
(a) fault (b) fold (c) outcrop (d) dyke

56. **The plane of contact between the two series of strata is called**
(a) homogeneity (b) heterogeneity (c) unconformity (d) dip and strike

57. **It is junction plane of one bed of rock with another**
(a) conformity (b) dip of bed (c) strike of bed (d) bedding plane

58. **The crest of fold where strata are bent up to form an arch is called**
(a) syncline (b) anticline (c) outlier (d) swilley

59. **It is an irregularity where the bed thins out generally due to erosion by river or stream. This is known as**
(a) roll (b) wash out (c) fold (d) barren ground

60. **In respect of fault, the vertical displacement of the fractured bed is called**
(a) heave (b) hade (c) throw of fault (d) fault plane

61. **A fault that runs at some angle between the dip and strike of the bed is called**
(a) dip fault (b) strike fault (c) oblique fault (d) throw of fault

62. **These are wavy undulations developed in country rocks whenever the region is subjected to severe pressure or stress**
(a) fault (b) fold (c) dyke (d) sill

63. **When axial lane of a fold is vertical and either of the limbs have the same amount of dip then such fold is described as**
(a) asymmetric (b) symmetric (c) fan (d) chevron

64. **The horizontal component of the apparent displacement of a bed, measured along the direction of dip of the fault is**
(a) throw of fault (b) heave of fault (c) hade of fault (d) horsts

65. **If it is found that a younger bed completely covers up and advances much beyond the limits of the underlying beds then the structure is called**
(a) non-conformity (b) overlap (c) complexity (d) net slip

66. **Which one of the following attitudes of the strata indicates vertical strata**
(a) ⊢ (b) ⊢ (c) ⊥ (d) None

67. **Joints are formed as a consequence of.....stress**
(a) Compressional (b) Shear (c) Lithostatic (d) Tensional

68. **The amount of dip is maximum in a direction at.....angles to the strike of the bedding planes**
(a) 0^0 (b) 90^0 (c) 45^0 (d) 180^0

69. **The axial plane is always**
(a) Vertical (b) Inclined (c) Horizontal (d) All of the above

70. **If the axial plane of a fold is inclined and both the limbs dip in the same direction usually at different angle, it is termed as**
(a) Asymmetrical fold (b) Overturned fold
(c) Recumbend fold (d) Isoclinal fold

71. **If the fold closes downward, it is known as**
(a) Synform (b) Syncline (c) Synclinorium (d) Synformal anticlinal

72. **Attitude of bed is defined by its**
(a) Axis and dip (b) dip and strike
(c) Strike and axis plane (d) axis and axial plane

73. **In which of the following fold axial plane is horizontal**
(a) Symmetrical fold (b) Asymmetrical fold
(c) Overturned fold (d) Recumbent fold

74. **Mural joints are generally develop in the**
(a) Basalt (b) Granite (c) Sandstone (d) None

75. **The joints develop in igneous rocks during cooling and compaction of magma mass are called**
(a) Primary joint (b) Master joint (c) Conjugate joint (d) None

76. **An anticline fold may be defined as a fold that**
(a) Is convex upward (b) Has older rocks in the centre
(c) The two limbs dip away from each other (d) All of the definitions are correct

77. **Which fold has got two hinges**
(a) Fan fold (b) Chevron fold (c) Isoclinal fold (d) Box fold

78. **When an anticline and syncline coincides, if results in a**
(a) Culmination (b) Depression (c) Both a and b (d) Dome

79. **When the strike of the fault is parallel to the strike of the rock-beds, the fault is called**
(a) Strike fault (b) Strike Slip fault (c) Dip Slip fault (d) Diagonal fault

80. **Folds that have parallel limbs are called**
(a) Isoclinal (b) Synclinal (c) Aniclinal (d) Overturned

81. **The angle of inclination of a rock bed with the horizontal plane is called**
(a) Dip (b) Joint (c) Strike (d) Bedding

82. **Maximum angle of dip on rock bed is called**
(a) Dip (b) Dip angle (c) True Dip (d) Both b and c

83. **Trend of a rock bed on the ground surface is called**
(a) Strike (b) Joint (c) Bedding Plane (d) None

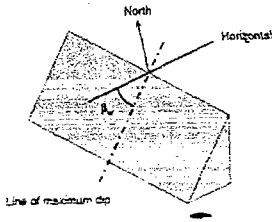
84. **The hanging wall appears to have moved downwards relative to the footwall. This type of fault known as**
(a) Normal fault (b) Reverse fault (c) Dip fault (d) Strike fault

85. **The hanging wall appears to have moved upward relative to the footwall. This type of fault known as**
(a) Normal fault (b) Reverse fault (c) Dip fault (d) Strike fault

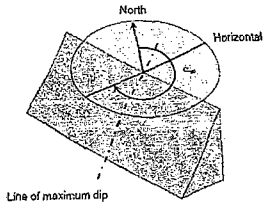
86. **Most fault planes are associated with a zone of crushed or altered rocks is known as**
(a) Fault Plane (b) Fault Scrap (c) Fault Zone (d) Normal Fault

87. **Find the Dip Angle**

Dip Angle



88. **Find the Dip Direction'**



89. **Match (A) Rock Type & (B) Type of Structure**

(A)	Rock Type	(B)	Structure:
(i)	sedimentary rocks	(b1)	bedded, laminated
(ii)	metamorphic	(b2)	massive, flow banded
(iii)	igneous rocks	(b3)	foliated, banded, cleaved

90. **Rocks that are formed by the cooling of molten material (called megma) at or relatively near the earth surface is called**
(a) igneous rocks (b) sedimentary rocks
(c) metamorphic rocks (d) crystalline

91. **It is more or less parallel sided vertical wall of igneous rock formed due t upward intrusion of molten magma through fissures r cracks and is a commo occurrence in coalfields. Guess it is**
(a) sill (b) laccolith (c) lava (d) dyke

92. **On the basis of which content the igneous rocks are classified as acid rock and basic rocks?**
(a) magnetite (b) hematite (c) bauxite **(d) silica**

93. **The geological age of gondowana rocks is believed to be during**
(a) archaeans to cambrians (b) Cambrian to Silurian
(c) cargoniferous to jurassic (d) cretaceous to Pliocene

94. **The top most horizon of the tertiary succession in Assam is known as**
(a) surma series (b) dihing series (c) barail series (d) jaintia series

95. **The study of fossils and their proper utilization in elucidating the past history of the earth is called**
(a) mineralogy (b) petrology
(c) palaeontology (d) structural geology

96. **In palaeontology the conversion of remains of plants and animals into rock is known as**
(a) fossils (b) petrification (c) moulds (d) carbonizatior

97. **The hollows left within the rock beds are filled up with mineral matter going rise to**
(a) moulds (b) casts (c) fossils (d) imprints

98. **Amongst the vertebrates, remains of reptiles occur abundantly in the rocks of**
(a) palaeozoic age (b) Mesozoic age (c) cainozoic age (d) Pleistocene age

99. **The half life of U^{238} is**
(a) 11900my (b) 4500 my (c) 47000 my (d) None of these

100. **Two theories are known to explain the heavy accumulation of vegetable and organic matter that formed coal seams. If one of the theories is drift theory, what is the other?**
(a) beam theory (b) keystone theory (c) in-situ theory (d) stratified theory

101. **Dull, friable appearance that soil the finger and most impure band in coal is known**
(a) clarain (b) fusain (c) durain (d) vitrain

102. **As per the sized gradation of coal, the size of rubble coal is**
(a) 51 mm to 200 mm (b) 25 mm to 50 mm
(c) 0 mm to 24 mm (d) any unscreened size

103. **In order to calculate useful heat value in Kcal per Kg of non-coking coal, besides ash percentage what is the name of other character which is considered?**
(a) carbon (b) moisture (c) volatile (d) sulphur

104. **Caking index is also known as**
(a) protodyakonov index (b) agglutinating index
(c) plasticity index (d) shatter index

105. **It is another method of washing which separate quality coal from its impurities through a simple process of partical stratification?**
(a) pulsitation (b) jigging (c) pulverization (d) infusion

106. **The gas formed by blowing a mixture of stream and air through a bed of hot coal is known as**
(a) coal gas (b) water gas (c) producer gas (d) coke oven gas

107. **Water gas is a combination of**
(a) $CO + H_2O$ (b) $CO + H_2$ (c) $CO + N_2$ (d) $CO + CH_4$

108. **India's coal is approximately 'A' percentage of Word's coal reserve.**
(a) 0.2% (b) 1% (c) 8% (d) 15%

109. **The branch of Geology that deals with the mode of occurrence, origin, distribution, classification and association of all minerals and rocks of economic importance is called**
(a) engineering geology (b) structural geology
(c) mineralogy (d) economic geology

110. **A deposit must contain at least certain percentage of metal in it and the lowest admissible limit of metallic content of an ore is known as**
(a) simple ore (b) economic ore (c) tenor (d) ore mineral

111. **In metalliferrous deposit, the ore minerals generally occur in association with some non-metallic minerals known as**
(a) late magmatic mineral deposit (b) cap rock
(c) ore shoots (d) gangue

112. **The mineralized vertical solution joints in carbonate country rock containing valuable deposits of metallic and non-metallic minerals is known as**
(a) ladder vein (b) saddle reefs (c) gash vein (d) grouting

113. **Only diamond mine is at**
(a) Rakha area (b) Panna area (c) Hutti Kanats (d) Malanjkhand

114. **The ore genesis include**
(a) Association of ores with igneous rock
(b) Presence of mineral deposit with gaseous emanations
(c) Origin of ore minerals from residual liquid of magma
(d) All of the above

115. **..... are the parents of mineral deposit.**
(a) Magma (b) water (c) gases (d) none of these

116. **The sources of mineral deposit are**
(a) Volcanoes (b) Fumaroles (c) Hot springs (d) All of these

117. **The magmatic ore deposit have closed relationship with the intrusive**
(a) Igneous rock (b) sedimentary rock
(c) metamorphic rock (d) none of these

118. **The concentration of chromite deposition in ultrabasic rock is an example of,**
(a) Dissemination deposit (b) Early magmatic segregation deposit
(c) liquid injection deposit (d) Immiscible liquid deposition

119. The high temperature deposits are,
(a) Mesothermal (b) Hypothermal (c) Epithermal (d) none of these

120. In which deposition no replacement is involved.
(a) Cavity filling deposit (b) Replacement deposit
(c) both (d) none

121. Pyrolusite is ,
(a) Iron ore (b) manganese ore (c) aluminium ore (d) copper ore

122. Bauxite is ,
(a) Iron ore (b) manganese ore (c) aluminium ore (d) copper ore

123. Galena is a ore of
(a) zinc (b) manganese ore (c) aluminium ore (d) Lead

124. Sphalerite is
(a) zinc (b) manganese ore (c) aluminium ore (d) Lead

125. Hematite is ..... ore.
(a) Iron ore (b) manganese ore (c) aluminium ore (d) copper ore

126. The Iron ore contain ..... mineral.
(a) Hematite (b) Magnetite (c) pyrite (d) all of these

127. Which mineral is an iron ore
(a) Bauxite (b) Malachite (c) Hematite (d) Galena

128. Diamond in kimberlite is good example of ———.
(a) Disseminated deposit (b) Segregated deposit
(c) Injected deposit (d) Pegmatitic deposit

129. Hydrothermal deposits are mostly
(a) syngenetic (b) epigenetic (c) residual (d) Placer

130. Which of the following mineral is non metallic,
(a) Lead (b) Zinc (c) Coal (d) Iron

131. The chief mineral of Uranium is,
(a) Monazite (b) Pitchblende (c) Thorite (d) None of these

132. Which mineral is an aluminium ore
(a) Bauxite (b) Malachite (c) Hematite (d) Galena

133. Iron and titanium ore deposit is good example of ———.
(a) Disseminated deposit (b) Segregated deposit
(c) Injected deposit (d) Pegmatitic deposit

134. Hydrothermal deposits are releted to :-
(a) Residual magma (b) high temperature magma
(c) both (d) none

135. Which of the following mineral is metallic,
(a) Gypsum (b) Muscovite (c) Coal (d) Iron

136. Protodyakonov strength number is used to denote
(a) rock designation (b) hardness of rocks
(c) rock specific gravity (d) rock luster

137. Which of the following reserve is least in quantity?
(a) proved (b) indicated (c) inferred (d) mineable

138. Block economics values in a 2D block model are shown below. Then based on the assumption of 1:1 slope angle, the blocks (identified by row and column numbers) that constitute the ultimate pit are

	1	2	3	4
1	-1	-1	1	-1
2	-1	1	3	-1
3	-1	-1	-1	-1

(a) (1,1), (1,2), (1,3), (2,2) (b) (1,2), (1,3), (1,4), (2,3)
(c) (1,3), (2,4) (d) (1,3), (1,4), (2,4)

139. Coalfication has taken place in order of
(a) Peat, Lignite, Bituminous, Anthracite (b) Lignite, Peat, Bituminous, Anthracite
(c) Peat, Lignite, Anthracite, Bituminous (d) Bituminous, Peat, Anthracite, Lignite

140. Coal seams are normally found in
(a) Sedimentary rocks (b) Igneous rocks
(c) Metamorphic rocks (d) Any type of rocks

141. In India a coal seam is defined as a thick coal seam if its thickness is
(a) 3m or more (b) 3.5m or more (c) More than 4.8m (d) 2.5m or more

142. If sandstone is the original rock then what is its metamorphic rock?
(a) slate (b) gneiss (c) quartzite (d) marble

143. **If granite is the original rock then what is its metamorphic rock?**
(a) gneiss (b) slate (c) schist (d) mica

144. **The extensive lava-flows giving rise to flat-topped mountains and plateaus is known as**
(a) deccan traps (b) volcano (c) swamp (d) loess

145. **The different geological periods during which mineral deposits were formed in abundance in certain sectors of globe are commonly known as**
(a) syngenetic period (b) metallogenetic period
(c) epigenetic period (d) sublimation period

146. **Metamorphism is a**
(a) Solid state reconstitution (b) Solid- liquid state reconstitution
(c) Solid- liquid-gas reconstitution (d) Liquid gas reconstitution

147. **Branch of geology dealing with formation, occurrence and classification of rocks under the**
(a) Petrology (b) Rock Geology (c) Petrography (d) Crystallography

148. **Felspars average percentage igneous rocks is**
(a) 59.2% (b) 59.5% (c) 58.7% (d) 59.6%

149. **The hot molten material occurring naturally below the surface of the earth is called**
(a) Magma (b) Lava (c) Volcanic Rock (d) Both a and b

150. **Broadly speaking all rock that have formed from an original hot, molten material through the process of cooling and crystallization, may be defined as**
(a) Igneous rock (b) Metamorphic rock (c) Sedimentary rock (d) None

151. **Rhyolite, Trachytes and Basalt is a**
(a) Volcanic Rock (b) Igneous Rock (c) Hypabasal Rock (d) Both a and b

152. **Granite, Syenite and Charnockites is a**
(a) Plutonic Rock (b) Igneous Rock (c) Hypabasal Rock (d) Both a and b

153. **Hypabyssal rocks are formed at below the earth surface up to depth of**
(a) 2 km (b) 2.5 km (c) 3km (d) 7km

154. **Plutonic rocks formed at considerable depths below the earth surface generally between**
(a) 6-7km (b) 7-10km (c) 4-6km (d) 9-11km

155. **Hypabassal rocks are mixed characteristics of**
(a) Volcanic and Plutonic rock (b) Plutonic and Hypabassal rock
(c) Volcanic and Hypabassal rock (d) Hypabassal and Igneous rock

156. **The Deccan traps of India spread over more than 4.0 lakh square kilometers in peninsular India are the best example of**
(a) Volcanic rock (b) Hypabassal rock (c) Both a and b (d) Plutonic rock

157. **When the large crystal imbedded in smaller ground mass. The texture is known as**
(a) Poikiolitic (b) Porphyritic (c) Ophitic (d) Both a and b

158. **Diagenesis is the process of formation of**
(a) Igneous rock (b) Sedimentary rock
(c) Metamorphic roc (d) Both b and c

159. **The metamorphism take place in the vicinity of igneous intrusion is known as**
(a) Regional (b) Dynamothermal (c) Contact (d) None

160. **When most of the grain in igneous rock are euhedral , the texture is known as**
(a) Hypidiomorphic (b) Panidiomorphic (c) Allotriomorphic (d) Both a and b

161. **Basalt is a rock of**
(a) Basic Nature (b) Acidic Nature (c) Ultrabasic Nature (d) Both a and b

162. **Granite formed in**
(a) Plutonic Condition (b) Volcanic Condition
(c) Hypabysal Condition (d) Both a and b

163. **Schistosity well developed in**
(a) Igneous rock (b) Sedimentary rock (c) Metamorphic rock (d) Both a and b

164. **The rock which are formed by erosion, weathering, transportation and ultimately deposition of pre-existing rock known as**
(a) Igneous rock (b) Sedimentary rock (c) Metamorphic rock (d) Both a and b

165. **When the percentage of silica occur less than 45%. This type of rock is known as**
(a) Acidic (b) Basic (c) Ultra basic (d) None

166. This method of drilling is not belonging to 'rotary' drilling –

(a) Drilling by rigid rods (b) drilling by saw tooth cutter
(c) Drilling by tricone roller bit (d) drilling by diamond drilling bit

167. In percussive drilling – hole is drilled by striking a number of blows at short intervals on the rock by chisel type tool, and between the blows the tool is rotated.

True/False

168. Cable drilling is also known as –

(a) Churn drilling (b) rotary drilling (c)Non-core drilling (d) None

169. Match the drill rod standard at (A) with hole dia. in mm (in B) & Core dia in mm in (C):

A(drill rod standard)	B(hole dia. in mm)	C(core dia.)
(a) NX	(i) 38 mm	(P) 21
(b) BX	(ii) 75 mm	(Q) 28
(c) AX	(iii) 47mm	(R) 54
(d) EX	(iv) 60	(S) 40

170. Arrange the surface arrangement of a Rotary drilling from bottom upwards –

(a) Drill Bit (b) Water swivel (c) Sheave (d) Water pump

171. Achieve better core recovery inhomogeneous formations with – ..... tube core barrel.

172. Double Tube Core Barrel helps in :

(a) Better recovery of core
(b) For safety in exploratory drilling
(c) Recovery of drill cuttings
(d) None of the above

173. Borehole deviation provides :

(a) Wrong information about the ore body location, size of the ore body etc.
(b) Clear information about the ore body
(c) No information during exploration
(d) None of the above

Answer Key

1	d	2	a	3	c	4	a	5	b	6	d
7	a	8	d	9	d	10	c	11	a	12	b
13	d	14	a	15	c	16	c	17	b	18	b
19	b	20	c	21	d	22	b	23	c	24	d
25	b	26	b	27	b	28	d	29	b	30	a
31	b	32	d	33	d	34	d	35	c	36	c
37	d	38	b	39	b	40	a	41	c	42	a
43	c	44	c	45	d	46	d	47	d	48	c
49	b	50	c	51	a	52	a	53	b	54	b
55	c	56	c	57	d	58	b	59	b	60	c
61	c	62	b	63	b	64	b	65	b	66	c
67	d	68	b	69	d	70	b	71	b	72	b
73	d	74	b	75	a	76	c	77	c	78	c
79	a	80	a	81	a	82	c	83	a	84	a
85	b	86	c	87	*	88	**	89	***	90	a
91	d	92	d	93	c	94	b	95	c	96	b
97	b	98	b	99	b	100	c	101	b	102	b
103	b	104	b	105	b	106	c	107	b	108	b
109	d	110	c	111	d	112	c	113	b	114	d
115	a	116	d	117	a	118	b	119	b	120	a
121	b	122	c	123	d	124	a	125	a	126	d
127	c	128	a	129	a	130	c	131	b	132	a
133	b	134	c	135	d	136	b	137	d	138	a
139	a	140	a	141	c	142	c	143	a	144	a
145	b	146	a	147	a	148	a	149	a	150	a
151	a	152	a	153	a	154	d	155	c	156	a
157	b	158	b	159	c	160	b	161	a	162	a
163	c	164	b	165	b	166	a	167	True	168	a
169	#	170	##	171	###	172	a	173	a		

87. Dip angle, βw:
the acute angle measured in a vertical plane between the line of maximum dip in a non horizontal plane and the horizontal plane
i.e. 0° = βw = 90°

88. Dip direction, αw:
the geographical azimuth measured in a clockwise direction from north (0°) of the vertical plane in which the dip angle is measured i.e. 0° = αw = 360°.

89. (i) + (b1), (ii) + (b3), (iii) + (b2)

169. (a)-(ii)-(R); (b)-(iv)-(S); (c)-(iii)-(Q); (d)-(i)-(P)

170. (a) + (d) + (b) + (c)

171. Single tube core barrel

Chapter 2

Management

1. **Given below are two statement followed by two conclusions. Assuming these statements to be true, decide which one logically follows :**
   Statements
   I. No manager is a leader II. All leaders are executives
   Conclusions :
   I. No manager is an executive II. No executive is a manager
   (a) Only conclusion I follows (b) Only Conclusion II follows
   (c) Neither conclusion I nor II follows (d) Both conclusions I & II follow

2. **Fill in the Blank –**
   ABC Analysis –
   A - .....consumption value items B-.....consumption value items
   C ..... consumption value items

3. **The basic steps of Project Management is Project appraisal. The aspects of project appraisal:-**
   (a) Technical appraisal (b) Commercial/Marketing appraisal
   (c) Economic/financial appraisal (d) Organizational & Management appraisal
   (e) All the above

4. **Name the branch of management that oversees an organization's human resources -**
   (a) personal management (b) human factor management
   (c) human resource management (d) business management

5. **The term "tight" refers to -**
   (a) not a good liaison with employees
   (b) integrity of people within the organization is not good
   (c) transactional administration is not dominating
   (d) not enough opportunity for jobs

6. **which of the following attributes is not desirable for an organization developing as good in the market**
   (a) flexibility (b) work centralization
   (c) appropriate levels of control (d) grant of authority

7. **What is the full form of HWWE?**
   (a) humanizing work and work environment
   (b) harmonizing work and workers in employment
   (c) hard work and work efficiency
   (d) hazardous work and work environment

8. **Which of the following do not under "external factors" affecting human driven organization?**
   (a) statutory regulations, rules and regulatory framework
   (b) trade union intervention
   (c) behavior of senior management people
   (d) social pressure

9. **According to Koontz and O'Donnell, it is the art of including the subordinates to accomplish their assignments with zeal and confidence**
   (a) motivation (b) facilitator (c) centralization (d) leadership

10. **It is such a behavior where the leader is very open minded and has mixing character**
    (a) paternalistic behavior (b) democratic behavior
    (c) autocratic behavior (d) laissez faire behavior

11. **In order to understand complexity of worker, the management experts have developed several models. Out of which Edger H Schein developed concepts on motivation of people. Name the model.**
    (a) situational model (b) behavioural model
    (c) trait model (d) democratic model

12. **It is the study originated by M E Mundel where motion pictures are taken at slow speeds**
    (a) time & motion study (b) micro-motion study
    (c) value engineering study (d) motion video study

13. **It is the activity that cannot be performed until the predecessor event has occurred. Identify it**
    (a) PERT activity (b) CPM activity
    (c) optimistic activity (d) fast-tracking activity

14. **Activities that can be delayed without making the project longer**
(a) critical (b) flexibility (c) total float (d) network activity

15. **If no one is aware of conflict, it is generally agreed that:**
(a) employee-employer relations will be good (b) conflict is subversive.
(c) no conflict exists. (d) conflict is inevitable.

16. **Which of the following is not a requirement in your text's definition of conflict?**
(a) must be perceived (b) overt acts only
(c) incompatibility (d) opposition

17. **_____ is a process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about.**
(a) Politics (b) Consideration (c) Power (d) Conflict

18. **Which of the following is not one of the views of conflict?**
(a) the traditional view (b) the human relations view ;
(c) the interactionist view (d) the inevitability view

19. **The traditional view of conflict argues that conflict:**
(a) cannot be avoide (d) (b) indicates a malfunctioning within the group.
(c) is good for a group (d) improves productivity.

20. **The traditional view of conflict is:**
(a) the belief that all conflict is harmful and must be avoided
(b) the belief that conflict is a natural and inevitable outcome in any group.
(c) the belief that conflict is not only a positive force in a group but that it is absolutely necessary for a group to perform effectively.
(d) no generalization about conflict is appropriate.

21. **Which one of the following is not part of the traditional view of conflict?**
(a) inevitable (b) must be avoided
(c) indicates malfunctioning (d) harmful

22. **Which one of the following views on conflict dominates in most actual groups and organizations?**
(a) human relations (b) interactionist
(c) traditional (d) functional

23. **The _____ view of conflict argues that conflict is a natural and inevitable outcome in any group.**
(a) human relations (b) interactionist
(c) traditional (d) functional

24. **The _____ view of conflict argues that some conflict is absolutely necessa for a group to perform effectively.**
(a) human relations (b) interactionist
(c) traditional (d) functional

25. **The _____ view of conflict argues that conflict indicates a malfunctioni within the group.**
(a) human relations (b) interactionist
(c) traditional (d) functional

26. **The human relations view of conflict argues that conflict is:**
(a) an inevitable outcome in any group.
(b) always a positive force in determining group performance.
(c) always a negative force in determining group performance.
(d) necessary for effective group performance.

27. **The human relations view of conflict advocates:**
(a) encouraging conflict.
(b) open communication for resolving conflict.
(c) group therapy for resolving conflict.
(d) acceptance of conflict.

28. **The interactionist view of conflict proposes that conflict is:**
(a) an indication of the group maturity level.
(b) necessary for effective group performance.
(c) a necessary evil. ;
(d) always evident in groups.

29. **According to the interactionist s perspective, a group that functions witho conflict is:**
(a) the ideal situation but is rarely achieved. ;
(b) prone to becoming static and apathetic.
(c) likely to be responsive to the need for change and innovation. ;
(d) the most productive.

30. **Encouraging group leaders to maintain an ongoing minimum level of confli is part of the _____ view of conflict.**
(a) functional (b)traditional (c)human relations (d) interaction

31. **_____ conflict supports the goals of the group and improves its performanc**
(a) Formal (b) Informal (c) Functional (d) Dysfunctional

32. **_____ conflict hinders group performance.**
(a) Formal (b) Informal (c) Functional (d) Dysfunctional

33. **Conflict is functional if it:**
(a) supports the goals of the group.
(b) is satisfying to the individual members of the group.
(c) causes group members to argue.
(d) causes turnover.

34. **Conflict that relates to the content and goals of the work is termed _____ conflict.**
(a) explicit (b)task (c) relationship (d) process

35. **Which is not one of the three types of conflict?**
(a) Task (b) job (c) relationship (d) process

36. **_____ conflict focuses on interpersonal relationships.**
(a) Task (b) Job (c) Relationship (d) Process

37. **_____ conflict relates to how the work gets done.**
(a) Task (b) Job (c) Relationship (d) Process

38. **_____ conflicts are almost always dysfunctional.**
(a) Task (b) Job (c) Relationship (d) Process

39. **The most important criterion in determining whether conflict is functional or dysfunctional is:**
(a) overall morale. (b) turnover rates.
(c) absenteeism levels. (d) group performance.

40. **The first stage of the conflict process is called:**
(a) cognition and personalization. (b) behavior.
(c) potential opposition or incompatibility. (d) outcomes.

41. **Which of the following is a stage in the conflict process?**
(a) functional conflict (b) dysfunctional conflict
(c) hindering conflict (d) incompatibility

42. **Which of the following is not a stage in the conflict process?**
(a) potential opposition (b) cognition
(c) vision (d) intentions

43. **The presence of conditions that create opportunities for conflict to arise is the _____ stage of the conflict process.**
(a) potential opposition (b) cognition
(c) vision (d) intentions

44. **Stage II of the conflict process deals with:**
(a) cognition and personalization of conflict. (b) group development.
(c) conflict avoidance. (d) interaction between group members.

45. **According to the text, the categories of antecedent conditions for conflict include all of the following except:**
(a) communication. (b) structure.
(c) group interaction. (d) personal variables.

46. **High job specialization causes _____ conflict.**
(a) communicative (b) structural
(c) personal-variable (d) antecedent

47. **Research confirms that participation and conflict are:**
(a) positively correlated. (b) counterproductive.
(c) negatively correlated. (d) always present together.

48. **In which stage are conflict issues defined?**
(a) Stage I, Potential opposition (b) Stage II, Cognition and personalization
(c) Stage III, Intuitions (d) Stage IV, Behavior

49. **_____ intervene(s) between people s perceptions and emotions and their overt behavior.**
(a) Intuition (b) Intention (c) Cognition (d) Attributions

50. **There are two dimensions to conflict-handling intentions, cooperativeness, and assertiveness. Cooperativeness is the degree to which:**
(a) one party attempts to satisfy the other party's concerns.
(b) one party attempts to satisfy his or her own concerns.
(c) both parties work toward a common goal.
(d) there is an absence of conflict.

51. **The dimension of the conflict-handling intention labeled assertiveness is:**
(a) the degree to which one party attempts to satisfy his/her own concerns.
(b) the degree to which one party attempts to satisfy the other party's concerns.
(c) the degree to which one party attempts to satisfy everyone's concerns.
(d) the degree to which one party is competitive.

52. **Which is not one of the five conflict-handling intentions?**
(a) Cooperating (b) competing (c) accommodating (d) avoiding

53. **The conflict-handling orientation that combines assertiveness and cooperation is:**
(a) collaborating. (b) competing. (c) avoiding. (d) accommodating.

54. **The unassertive and uncooperative conflict-handling orientation is:**
(a) collaborating. (b) accommodating. (c) avoiding. (d) competing.

55. **Attempting to find a win-win solution that allows both parties goals to be completely achieved and seeking a conclusion that incorporates the valid insights of both parties is an example of which conflict handling intention?**
(a) collaborating (b) accommodating (c) avoiding (d) competing

56. **Which type of conflict-handling intention results in a person's withdrawing from conflict?**
(a) competing (b) avoiding (c) accommodating (d) compromising

57. **Conflict-handling behaviors are initiated in _____, in which there is a dynamic process of interaction.**
(a) Stage II of the conflict process (b) Stage III of the conflict process
(c) Stage IV of the conflict process (d) Stage V of the conflict process

58. **The two dimensions of conflict-handling orientations are:**
(a) awareness and assertiveness. (b) reliability and awareness.
(c) cooperativeness and assertiveness. (d) independence and interdependence.

59. **Trying to make someone else accept blame for a problem is an example of which conflict-handling orientation?**
(a) competing (b) avoiding (c) accommodating (d) compromising

60. **Which one of the following conflict-handling orientations represents an attempt to find a win-win solution?**
(a) avoiding (b) collaborating (c) accommodating (d) compromising

61. **Collaborating is the preferred conflict-handling orientation:**
(a) to build social credits for later issues. (b) in emergencies.
(c) to gain consensus and commitment. (d) when an issue is trivial.

62. **_____ is when one party is willing to be self-sacrificing in order that the relationship can be maintained.**
(a) Competing (b) Accommodating (c) Collaborating (d) Compromising

63. **The conflict-handling orientation that is based on a process of give-and-tak and an emphasis on "splitting the difference" is:**
(a) avoiding. (b) collaborating. (c) accommodating. (d) compromising

64. **To achieve a compromising approach one needs to:**
(a) avoid overt disagreement. (b) value openness and trust.
(c) dominate the other conflicting party. (d) give up something of value.

65. **A willingness to accept a raise of Rs.200/- an hour rather than Rs.300/-, t acknowledge partial agreement with a specific viewpoint, and to take a partia blame for an infraction are examples of:**
(a) avoiding. (b) collaborating. (c) accommodating. (d) compromising

66. **In which stage of the conflict process does conflict become visible?**
(a) potential opposition or incompatibility (Stage I)
(b) cognition and personalization (Stage II)
(c) intentions (Stage III) (d) behavior (Stage IV)

67. **Which of the following is not a conflict resolution technique?**
(a) superordinate goals (b) appointing a devil's advocate
(c) avoidance (d) authoritative command

68. **Conflict management techniques can:**
(a) resolve conflict. (b) stimulate conflict.
(c) both resolve and stimulate conflict. (d) none of the above

69. **Which of the following is a conflict stimulation technique?**
(a) expansion of resources (b) compromise
(c) bringing in outsiders (d) authoritative command

70. **What is conflict management?**
(a) achieving the desired conflict level (b) stopping all conflict
(c) stimulating conflict (d) avoiding conflict

71. **Conflict is constructive when:**
(a) it improves the quality of decisions. (b) it stimulates creativity and innovation
(c) it fosters an environment of self-evaluation and change.
(d) all of the above

72. **Which one of the following might not be a functional outcome of the conflic process?**
(a) stimulates creativity (b) avoids risk
(c) fosters environment of self-evaluation (d) relieves tensions

73. **Conflict is dysfunctional when it:**
(a) provides a medium to release tension.
(b) reduces group cohesiveness.
(c) fosters an environment of self-evaluation and change.
(d) provides a means for releasing tensions.

74. **A common ingredient in organizations that successfully create functional conflict is that they:**
(a) reward dissent and punish conflict avoiders. (b) shoot the messenger.
(c) formally assign devil's advocates. (d) avoid risky situations.

75. **If you support the idea that conflict is bad and should be eliminated, you are supporting:**
(a) the traditional view. (b) the human relations view.
(c) the interactionist view. (d) the moderated acceptance view.

76. **You have decided to accept conflict as a natural occurrence and deal with it. You are supporting:**
(a) the traditional view. (b) the human relations view.
(c) the interactionist view. (d) the behavior modification view.

77. **You decide to do more research on the view that conflict should be encouraged as a means to achieve change and innovation. This view is termed:**
(a) the traditional view. (b) the human relations view.
(c) the interactionist view (d) the acceptance view.

78. **When the group disagrees, it is usually over how the work should get done. The type of conflict experienced by your group is:**
(a) task conflict. (b) relationship conflict
(c) process conflict. (d)traditional conflict.

79. **You have decided to allow the conflict to exist so long as it doesn t hinder group performance. You will try to eliminate _____ conflict.**
(a) functional (b) dysfunctional (c) task (d) individualized

80. **Last month, Jennifer s department experienced constructive conflict during a meeting. Which of the following is not an outcome of this functional conflict?**
(a) improved quality of decisions (b) creativity and innovation are stimulated
(c) tensions are released (d) communication is retarded

81. **When "yes" people are hired and promoted, _____ outcomes are likely to result.**
(a) improved organizational (b) functional
(c) dysfunctional (d) better decisions

82. **Conflict:**
(a) can be positively related to productivity. (b) is always dysfunctional.
(c) can arise from diversity. (d) all of the above

83. **Which of the following is a characteristic of distributive bargaining?**
(a) I win, you win (b) long-term focus ;
(c) convergent or congruent interests (d) opposed to each other

84. **You have decided to try to find a win-win situation. You have decided to find a way to engage in:**
(a) integrative bargaining. (b) distributive bargaining.
(c) mediation. (d) BATN(A)

85. **Which of the following is/are pre-judgement(s) of the „Hawthorne Studies? I. Perceived meaning and importance of the work determine the output. II. Job performance depends on the individual worker. III. Workplace culture sets its own production standards.**
(a) Only (I) above (b) Only (II) above
(c) Only (III) above (d) Both (II) and (III) above

86. **If a manager develops a new idea and gives a plan for development of a new product in his workplace, then he is carrying out which of the following roles?**
(a) Liaison (b) Entrepreneur (c) Disseminator (d) Disturbance handler

87. **Which of the following is the employer-employee authority relationship that follows the chain of command?**
(a) Staff authority (b) Referent power (c) Line authority (d) Functional authority

88. **Which of the following steps in the planning process should be completed before the others can be addressed?**
(a) Putting plans into action (b) Stating organizational objectives
(c) Listing alternative ways of reaching objectives
(d) Developing premises on which to base each alternative

89. **Which of the following is a factor that affects delegation of authority from the delegant s aspect?**
(a) Love for authority (b) Fear of exposure
(c) Experiences of the superior (d) Fear of criticism

90. **Standing plans that furnish broad guidelines for channeling management thinking in specified direction are called**
(a) Single-use plans (b) Programs (c) Procedures (d) Policies

91. **Which of the following is/are advantage(s) of a functional structure? I. Permits growth and diversity of products and services. II. Power and prestige. III. Clarity about career paths. IV. Furnishes measurable training ground for general managers.**
(a) Only (I) above (b) Both (I) and (IV) above
(c) Both (II) and (III) above (d) (I), (II) and (III) above

92. **Various moderating variables determine whether a manager will act in an ethical or unethical manner. Which of the following individual characteristics indicates the degree to which people believe they are masters of their own fate?**
(a) Perception (b) Value (c) Attitude (d) Locus of Control

93. **Power based upon identification with a person who has desirable resources or personal traits is known as**
(a) Coercive power (b) Legitimate power (c) Expert power (d) Referent power

94. **If Coal India Ltd, wished to examine its general environment before constructing its business strategy, the company would explore all of the following environments except**
(a) Sociocultural (b) Knowledge (c) Global (d) Economic

DECISION MAKING

95. **Many sophisticated techniques or tolls are useful in decision-making. Which of the following is a tool that helps managers figure out how much to produce and points out the relationship between revenues, costs, and profits?**
(a) Marginal analysis (b) Breakeven analysis
(c) Ratio analysis (d) Financial analysis

96. **With respect to factors that affect reorganization, when a single change triggers off a sequence of related changes, it is called the**
(a) Halo effect (b) Hawthorne effect (c) Domino effect (d) Sensitivity effect

97. **Which of the following is a method that can be used to overcome the tendency toward conformity in group decision-making?**
(a) Brainstorming (b) Nominal group technique
(c) Group think (d) Electronic meetings

98. **Which of the following is a strength of the divisional structure?**
(a) It focuses on results
(b) It gains advantages due to work specialization
(c) Employees have more than one boss
(d) It is based solely on teams

99. **Douglas McGregor's view that suggests that employees will exercise s direction and self-control when they are committed to the objectives of t work is called:**
(a) Theory X (b) Theory Z (c) Theory Y (d) Theory A

100. **Which step in Maslow's Hierarchy of Needs Theory deals with achieving on potential?**
(a) Self-actualization (b) Safety
(c) Esteem (d) Physiological

101. **Which of the following would be classified by Herzberg as a hygiene factc**
(a) Responsibility (b) Company policy
(c) Personal growth (d) Achievement

102. **Who proposed that achievement, affiliation and power are three importa needs that help explain motivation in workplace situations?**
(a) McClelland (b) Maslow (c) Alderfer (d) Herzberg

103. **Company policy, administration, supervision, interpersonal relations, worki conditions, and salary are characterized as:**
(a) Growth factors (b) Achievement factors
(c) Hygiene factors (d) Motivating factors

104. **An individual's perception of whether performing at a particular level w lead to attainment of a desired outcome is termed:**
(a) Relevance (b) Expectancy (c) Expectation (d) Instrumentality

105. **Expectancy theory is an example of a:**
(a) Process Theory (b) Goal-setting Theory ;
(c) Needs Theory (d) Cognitive Evaluation Theory

106. **Which of the following steps is important to improving expectancy?**
(a) Create the belief that effort is related to performance.
(b) Ask employees what rewards they value. ;
(c) Deliver rewards as promised.
(d) Make the rewards meaningful.

107. Management by objectives emphasizes participatively setting goals that are:
(a) General in nature. (b) Easy to attain.
(c) Easy to create and develop. (d) Tangible, verifiable, and measurable.

108. For the individual employee, MBO provides:
(a) Specific personal performance objectives.
(b) Communication between co-workers.
(c) A means to an end.
(d) A way to keep the company accountable.

109. Research indicates that financial incentives _____ commitment to difficult goals.
(a) do not impact (b) significantly increase
(c) decrease (d) increase

110. An individual's belief that he or she is capable of performing a task is called:
(a) Self-actualization (b) Self-worth
(c) Self-efficacy (d) Self-importance

111. The major benefit of having employees participate in goal setting is:
(a) That it provides the company with greater financial stability.
(b) That it appears to induce employees to accomplish more difficult goals and tasks.
(c) That it takes less time and resources to implement this type of system.
(d) That it provides more time for management to pursue other activities.

112. Employee recognition can:
(a) Be a strong motivator. (b) Lead to unrealistic expectations.
(c) Help with MBO program implementation. (d) Assist with goal setting.

113. The theory that an employee will compare his or her job inputs and outcomes relative to others is called:
(a) Employee Theory (b) Comparative Theory ;
(c) Performance Theory (d) Equity Theory

114. Allocating extrinsic rewards for behaviour that has been previously intrinsically rewarded tends to decrease the overall level of motivation, and is called:
(a) Reward Evaluation Theory (b) Extrinsic Evaluation Theory ;
(c) Cognitive Evaluation Theory (d) Intrinsic Evaluation Theory

115. Alfie Kohn suggests that for people to be motivated it is only necessary to provide the right :
(a) Incentives (b) Rewards (c) Environment (d) Compensation

116. An employee's experience in a situation or position outside his or her current organization is a referent comparison called:
(a) Other-inside (b) Self-outside (c) Self-inside (d) Other-outside

117. What are the most common hours for a "professional" to work in a week?
(a) Whenever they feel (b) Part-Time
(c) Until the job is done (d) Self-within

118. Theory X suggests that employees:
(a) Dislike work (b) Dislike their manager
(c) Like work (d) None of the above

119. What three words define motivation?
(a) Persistence, fairness, ambition (b) Ambition, direction, intensity
(c) Desire, persistence, fairness (d) Intensity, direction, persistence

120. What does ERG stand for?
(a) Excellent, relationship, growth (b) Expectancy, real, exist
(c) Employee, related, greatness (d) Existence, relatedness, growth

121. The theory that individuals act depending upon their evaluation of whether their effort will lead to good performance, whether good performance will be followed by a reward, and whether that reward is attractive to them, is called:
(a) Equity Theory (b) Expectancy Theory
(c) Empirical Theory (d) Outcome Theory

122. Which answer corresponds to a person's internal desire to do something, due to such things as interest, challenge and personal satisfaction?
(a) Theory X (b) Extrinsic motivators
(c) Intrinsic motivators (d) Theory Y

123. What is valence?
(a) The value or importance an individual places on a reward
(b) The importance of doing something well
(c) The value of an object to a person
(d) The knowledge and effort put into something

124. Transformational leadership is about change, _____, and entrepreneurship.

(a) Motivation (b) innovation (c) loyalty (d) enthusiasm

125. While considering the seven leadership styles described by the leadership–continuum, all of the following are variables that need to be considered for a manager, EXCEPT,
(a) manager's preferred style based on experience.
(b) manager's preferred style based on expectation.
(c) manager's preferred style based on knowledge.
(d) manager's preferred style based on confidence in upper management.

126. This is a supervisory style which involves high-directive–high-supportive behavior (HD–HS) and is appropriate when interacting with moderate-capability employees.
(a) autocratic style (b) participative style
(c) consultative style (d) laissez-faire style

127. Which of the following management substitutes is characterized by formalization, inflexibility, and closely knit work groups?
(a) Characteristics of subordinates. (b) Characteristics of managers.
(c) Characteristics of the organization. (d) Characteristics of task.

128. Being conscientious, admitting mistakes, and knowing one's strengths and limitations are the skills associated with _____.
(a) Competence (b) consistency (c) loyalty (d) integrity

129. The leader's behavior actually makes the leader's style.
(a) True (b) False

130. Only managers can be true leaders, because they have the ability to influence others.
(a) True (b) False

131. Transformational leadership focuses on middle and first line managers.
(a) True (b) False

132. To determine whether one's leadership style is task- or relationship-oriented, the leader must fill in the Least Coworker Participation (LCP) scale.
(a) True (b) False

133. The supportive style is largely absent in the autocratic supervisory style.

(a) True (b) False

134. Which of the following statements about leadership is false?
(a) Leadership does not necessarily take place within a hierarchical structure of organisation.
(b) Not every leader is a manager.
(c) When people operate as leaders their role is always clearly established a define(d)
(d) All the above

135. Within an organisation, leadership influence will be dependent upon the ty of _____ that the leader can exercise over the followers.
(a) Power (b) friendship (c) knowledge (d) delegation

136. Which of the following sources of power are among those identified by Frenc and Raven?
(a) Reward power (b) Referent power (c) Expert power (d) All the abo

137. Legitimate power is based on the subordinate s perception that the lead has a right to exercise influence because of the leader s
(a) role or position within the organization (b) ability to punish or reward
(c) personal characteristics and personality (d) expertise and knowledge

138. The functional approach to leadership emphasises that
(a) the various functions of leadership cannot be shared among members of group
(b) leadership resides in a particular person and not in the functions
(c) both of the above
(d) neither of the above

139. Adair claims that the effectiveness of a leader is dependent upon meetin _____areas of need within the work group.
(a) three (b) four (c) two (d) none of the above

140. Needs such as training the group, setting standards and maintaining discipline and appointing sub-leaders may be called
(a) individual functions (b) task functions
(c) team functions (d) work functions

141. The _____ style of leadership is where the focus of power is wit the manager. The manager alone exercises decision-making, authority an

the control of rewards or punishments.
(a) democratic (b) laissez-faire (c) authoritarian (d) None of the above

142. Contingency theories of leadership are based on the belief that
(a) there is no single style of leadership appropriate to all situations
(b) there is a single style of leadership appropriate to all managers
(c) there is a single style of leadership appropriate to all situations
(d) none of the above

143. Hersey and Blanchard present a form of situational leadership based on the _____ of the people the leader is attempting to influence.
(a) Readiness (b) personality (c) intelligence (d) motivation

144. When determining the most appropriate form of leadership, which of the following should be considered?
(a) The manager (b) The group
(c) The work environment (d) All the above

145. The following four different approaches to management thinking were developed in the first half of the 20th century:
(a) Scientific management, general administrative, quantitative, and contingency approach.
(b) Scientific management, general administrative, quantitative, and organizational behavior.
(c) General administrative, globalization, organizational behavior, and quantitative.
(d) Systems approach, scientific management, general administrative, and organizational behaviour.

146. When we classify managers according to their level in the organization they are described as _____.
(a) Functional, staff and line managers
(b) Top managers, middle managers and supervisors
(c) High level and lower level managers ;
(d) General managers and administrative managers

147. Frederick Taylor and Frank and Lillian Gilbreth were advocates of an approach to management involving the use of scientific method, known as:
(a) The quantitative approach. (b) Management science.
(c) Scientific management. (d) The contingency approach.

148. Authority, discipline, unity of command, and unity of direction are:
(a) Taylor's four principles of management.
(b) Principles of the human relations movement.

(c) Elements of Weber's ideal bureaucratic structure.
(d) Four of Fayol's fourteen principles of management.

149. Some of the other fields of study that affect management theory or practice include:
(a) Political science, philosophy, anthropology and sociology
(b) Zoology, psychology, sociology and philosophy.
(c) Anthropology, astrology, political science and psychology.
(d) Political science, sociology, typography and economics.

150. The philosophy of management known as total quality management developed primarily out of the work of:
(a) Henri Fayol (b) Frederick Taylor
(c) Robert McNamara (d) W. Edwards Deming

151. Possibly the most important pre-20th century influence on management was:
(a) Therbligs (b) The industrial revolution.
(c) Scientific management. (d) The division of labor.

152. _____ need involves the desire to affiliate with and be accepted by others.
(a) Esteem (b) Belongingness (c) Safety (d) Self Actualization

153. Needs that impel creativity and innovation, along with the desire to have a productive impact on our surroundings are _____ needs.
(a) Existence (b) Relatedness (c) Growth (d) None of the Above

154. Division of labor, authority hierarchy, formal selection, formal rules and regulations, impersonality, and career orientation are all features of:
(a) Weber's ideal type bureaucracy. (b) General administrative theory.
(c) Fayol's principles of management. (d) Taylor's principles of management.

155. The decision-making model consists of four styles: directive, analytic, behavioral and _____.
(a) Conceptual (b) Intuitive (c) Group interaction (d) Laggard

156. _____ is characteristic of liquidity ratios.
(a) Organization's ability to meet its current debt obligations
(b) Organization's use of debt to finance its assets and whether it's able to meet the interest payments on the debt
(c) How efficiently the firm is using its assets (d) None of given options

157. _____ is a communication that flows from a higher level to one or more

lower levels in the organization.
(a) Horizontal communication (b) Upward communication
(c) Downward communication (d) None of given options

158. 1st stage of group development is _____.
(a) Storming (b) Norming (c) Forming (d) Performing

159. _____ is an individual's capacity to influence decisions
a) Span of control (b) Line authority (c) Staff authority (d) Power

160. An organizational design with low departmentalization, wide spans of control, authority centralized in a single person and little formalization are characteristics of _____.
(a) Simple structure (b) Functional structure
(c) Divisional structure (d) None of given option

161. _____ is the form of departmentalization that groups similar jobs and activities into departments.
(a) A product structure (b) A divisional structure
(c) A matrix structure (d) A functional structure

162. The main influence on the behavioral science theories were:
(a) Psychology and sociology. (b) Sociology and bureaucracy.
(c) Sociology and science. (d) Bureaucracy and psychology.

163. ERG theory was introduced by _____.
(a) Clayton Alderfer (b) McClelland
(c) Douglas McGregor (d) J. Stacey Adams

164. _____ is counter to goal-setting theory.
(a) Expectancy Theory (b) Reinforcement Theory
(c) ERG Theory (d) None of given option

165. _____ is not one of the eight steps in the decision making process.
(a) Identifying the problem (b) Analyzing alternative solutions
(c) Implementing the decision (d) Delegating the decision making

166. _____ is the capacity to affect the behaviors of others.
(a) Leadership (b) Power (c) Trait (d) Aggression

167. The vertical flow of communication from lower level to one or more higher levels is _____.
(a) Upward communication (b) Downward communication
(c) Formal Communication (d) Horizontal communication

168. Inputs necessary for the group to operate are _____ inputs.
(a) Group Size (b) Work Group (c) Group Task (d) None of the Above

169. A_____ is the combining of two or more companies into one organizatio
(a) Merger (b) Acquisition ;
(c) Diversification (d) None of the given options

170. The General Manager's meeting was most likely a result of the followin management function:
(a) Organizing (b) Planning (c) Decision-Making (d) Controlling

171. Managers today realize that long-term success can be achieved primarily b satisfying the customer. Customers are demanding quicker service, high quality, and more _____.
(a) Value for their money (b) Personal attention
(c) Variety in services (d) Online choices

172. The belief that a firm's obligation goes beyond that required by law an economics, and includes a pursuit of long-term goals that are good for socie is known as:
(a) Social responsiveness (b) Ethical responsibility
(c) Social responsibility (d) Social obligation

173. Challenging goals usually lead to _____ performance from individua and groups.
(a) Higher (b) Lower (c) Excellent (d) None of the Above

174. Which of the following is not a basic function of the management process
(a) Controlling (b) Organizing (c) Working (d) Leading

175. One of the greatest effects of e-commerce is that:
(a) Costs will be reduced (b) Customers will be empowered
(c) Employees become more powerful (d) Computers will

176. Which of the following has been the main driver to the globalization business?
(a) The higher standards of living in the U.S. and Europe
(b) Technology
(c) The NAFTA trade agreement
(d) The increasing ethnic diversity within countries

177. Operations management is applicable
(a) mostly to the service sector

(b) mostly to the manufacturing sector
(c) to manufacturing and service sectors
(d) to the manufacturing sector exclusively

178. Henry Ford is noted for his contributions to
(a) standardization of parts (b) statistical quality control
(c) assembly line operations (d) scientific management 1

179. Taylor and Deming would have both agreed that
(a) Whirlpool's global strategy is a good one
(b) Eli Whitney was an important contributor to statistical theory
(c) Management must do more to improve the work environment and its processes so that quality can be improved
(d) The era of Operations Management will be succeeded by the era of scientific management

180. Who among the following is associated with contributions to quality control in operations management?
(a) Charles Babbage (b) Frank Gilbreth
(c) W. Edwards Deming (d) Henri Fayol

181. The field of operations management is shaped by advances in which of the following fields?
(a) chemistry and physics (b) industrial engineering and management science
(c) information sciences (d) all of the above

182. The five elements in the management process are
(a) plan, direct, update, lead, and supervise
(b) accounting/finance, marketing, operations, and management
(c) organize, plan, control, staff, and manage
(d) plan, lead, organize, manage, and control

183. The responsibilities of the operations manager include
(a) planning, organizing, staffing, procuring, and reviewing
(b) forecasting, designing, planning, organizing, and controlling
(c) planning, organizing, staffing, leading, and controlling
(d) designing and operating

184. Which of the following is not an element of the management process?
(a) pricing (b) staffing (c) planning (d) leading

185. An operations manager is not likely to be involved in.....
(a) the design of products and services to satisfy customers' wants and needs

(b) the quality of products and services to satisfy customers' wants and needs
(c) the identification of customers' wants and needs
(d) forecasting sales

186. All of the following decisions fall within the scope of operations management except for.....
(a) financial analysis
(b) design of products and processes
(c) location of facilities
(d) all of the above fall within the scope of operations management

187. Which of the following are the primary functions of all organizations?
(a) operations, marketing, and human resources
(b) marketing, human resources, and finance/accounting
(c) sales, quality control, and operations
(d) research and development, finance/accounting, and purchasing

188. Budgeting, paying the bills, and collection of funds are activities associated with the
(a) management function (b) finance/accounting function
(c) production/operations function (d) staffing function

189. Which of the following would not be an operations function in a fast-food restaurant?
(a) making hamburgers and fries (b) advertising and promotion
(c) maintaining equipment (d) designing the layout of the facility

190. The three major functions of business organizations
(a) are mutually exclusive (b) exist independently of each other
(c) overlap (d) function independently of each other

191. The marketing function's main concern is with
(a) producing goods or providing services
(b) procuring materials, supplies, and equipment
(c) building and maintaining a positive image
(d) generating the demand for the organization's products or services

192. Current trends in operations management include all of the following except
(a) Just-in-time performance (b) rapid product development
(c) mass customization (d) mass production

193. Typical differences between goods and services do not include

(a) cost per unit (b) ability to inventory items
(c) timing of production and consumption (d) knowledge content

194. Which of the following inputs has the greatest potential to increase productivity?
(a) labor (b) management (c) capital (d) None of the above

195. Forecasts used for new product planning, capital expenditures, facility location or expansion, and R&D typically utilize a.....
(a) short-range time horizon (b) long-range time horizon
(c) naive method, because there is no data history
(d) all of the above

196. The three major types of forecasts used by business organizations are
(a) strategic, tactical, and operational
(b) economic, technological, and demand
(c) exponential smoothing, Delphi, and regression
(d) departmental, organizational, and territorial

197. Which of the following is no step in the forecasting process?
(a) determine the use of the forecast (b) eliminate any assumptions
(c) determine the time horizon (d) validate and implement the results

198. The two general approaches to forecasting are.....
(a) qualitative and quantitative (b) mathematical and statistical
(c) judgmental and qualitative (d) judgmental and associative

199. Which of the following uses three types of participants: decision makers, staff personnel, and respondents?
(a) executive opinions (b) sales force composites
(c) the Delphi method (d) time series analysis

200. Which of the following is not type of qualitative forecasting?
(a) executive opinions (b) sales force composites
(c) the Delphi method (d) moving average

201. The forecasting model that pools the opinions of a group of experts or managers is known as the.....
(a) sales force composition model (b) jury of executive opinion model
(c) consumer market survey model (d) management coefficients model

202. Which of the following techniques uses variables such as price and promotional expenditures, which are related to product demand, to predict demand?
(a) associative models (b) exponential smoothing
(c) weighted moving average (d) time series

203. The fundamental difference between cycles and seasonality is the
(a) duration of the repeating patterns (b) magnitude of the variation
(c) ability to attribute the pattern to a cause (d) all of the above

204. Increasing the number of periods in a moving average will accomplish great smoothing, but at the expense of.....
(a) manager understanding (b) accuracy
(c) stability (d) responsiveness to changes

205. Organizational structure is made up of key elements. Which of the followir is not one of these elements?
(a) Span of control (b) Centralization
(c) Decentralization (d) Co-ordination

206. Which of the following is one of the six key elements a manager needs t consider when designing an organization s structure?
(a) Job design (b) Work specialization
(c) Feminine organization (d) Eliminating chain of command

207. One of the most popular ways to group activities is by.....
(a) Product (b) Function (c) Process (d) Geography

208. Sun Petroleum Products departmentalizes by fuels, lubricants, and waxe and chemicals. This is an example of departmentalization by.....
(a) Product (b) Functions (c) Job design (d) Customer

209. Which type of departmentalization achieves economies of scale by placir people with common skills and orientations into common units?
(a) Geographic (b) Product (c) Process (d) Functional

210. When jobs are grouped together based on a particular type of customer, th is known as.....
(a) Job structuring (b) Formalization
(c) Centralization (d) Departmentalization

211. Which of the following trends is gaining momentum?
(a) Using less departmentalization
(b) Geographical departmentalization

(c) Using only one type of departmentalization
(d) Using more customer departmentalization

212. The unbroken line of authority that extends from the top of the organization to the lowest echelon and clarifies who reports to whom is termed.....
(a) Unity of command (b) Authority
(c) Power and authority structure (d) Chain of command

213. What is span of control?
(a) empowering lower-level employees
(b) concentrating decision-making on one specific point in the organization
(c) centralization
(d) number of subordinates a manager can effectively direct

214. Centralization refers to.....
(a) The degree to which decision-making is concentrated at a single point in the organization
(b) The development and maintenance of power in the organization (c) The decision-making process
(d) The geographic dispersion of an organization

215. In an organization that has high centralization.....
(a) Problem can be quickly and efficiently solved
(b) The corporate headquarters is located centrally to branch offices
(c) Top managers make all the decisions-lower-level managers merely carry out directions
(d) All top-level officials are located within the same geographic area

216. The degree to which jobs within an organization are standardized is referred to as.....
(a) job variation (b) routineness (c) formalization (d) centralization

217. In a highly formalized organization, job behaviours are relatively
(a) Non programmed (b) Non-existent
(c) Programmed (d) Discretionary

218. Employee discretion is inversely related to.....
(a) Centralization (b) Standardization (c) Complexity (d) Decentralization

219. Which of the following structures is characterized by centralization, high formalization, extensive departmentalization, and a limited information network?

(a) Technology model (b) Mechanistic model
(c) Job satisfaction model (d) Organic model

220. If there is low formalization, a comprehensive information network and high participation in decisionmaking, one would expect.....
(a) A mechanistic structure (b) A typical government organization
(c) A stable structure (d) An organic structure

221. Which of the following is characterized by wide spans of control, little formalization, a low degree of departmentalization, and authority centralized in a single person.....
(a) Bureaucracy (b) Simple structure
(c) Matrix organization (d) Mechanistic structure

222. Which organization is characterized by very formal rules, centralized authority, and narrow spans of control?
(a) Boundaryless (b) Matrix (c) Virtual (d) Bureaucracy

223. The matrix structure combines which two forms of departmentalization?
(a) Simple And functional (b) Functional and product
(c) Virtual and team (d) Product and organic

224. Which of the following problems is most likely to occur in a matrix structure?
(a) Decreased employee motivation
(b) Employees receiving conflicting directives
(c) Decreased response to environmental change
(d) Decreased coordination

225. Which structure breaks down departmental barriers and decentralizes decision-making to the level of the work team?
(a) Boudaryless (b) Feminine (c) Team (d) Virtual

226. Which type of organization outsources major business functions?
(a) Modular (b) Innovation (c) Virtual (d) Feminine

227. The innovation strategy is characterized by.....
(a) A mixture of loose with tight properties
(b) Looser controls for new undertakings
(c) Low specialization and low formalization
(d) Tight controls over current activity

228. A continually evolving network of independent companies, suppliers, customers, even competitors, linked together to share skills, costs, and access

to one another's markets is called a/an.....
(a) Virtual organization (b) Boundary-less organization
(c) Modular organization (d) Integrated organization

229. An organization that seeks to eliminate the chain of command, have limitless spans of control, and replace departments with empowered teams is called a/an.....
(a) Cooperative organization (b) Virtual organization ;
(c) Boundaryless organization (d) Modular organization

230. Which dimension of an organization s environment refers to the degree to which it can support growth?
(a) Volatility (b) Technology (c) Capacity (d) Complexity

231. Neoclassical economics concerns itself with the determination of various prices. In the branch of Microeconomics, economists are concerned with _____, while in Macroeconomics they consider _____
(a) Price rises: price falls
(b) Real prices: nominal prices
(c) Individual product prices: the aggregate price level
(d) Costs to consumers: costs to producer

232. During the downturn portion of a business cycle, the economy is characterized by
(a) rising unemployment and rising investment
(b) falling unemployment and falling output
(c) rising profits and falling wages
(d) falling output and rising unemployment

233. Changes in behavior as a result of observation and manipulation of conditions in an environment are termed.....
(a) The Hawthorne effect (b) Group dynamic
(c) Social influence (d) Sociometry

234. Members within a group that share similar experiences and feelings are known to have..... An important factor of the preplanning stage in group dynamics is determining what the group is to accomplish; this is known as.....
(a) Goal setting (b) Cohesion (c) Clarity of purpose (d) Group orientation

235. .....Groups have members who have similar presenting problems or are similar in gender, ethnicity, or social backgroun(d)
(a) Heterogeneous (b) Ideal (c) Dynamic (d) Homogeneous

236. Role _____ is a conflict between the role an individual has outside the group and the role he or she is expected to have in the group.
(a) Collision (b) Transition (c) Confusion (d) Incompatibility

237. Which role in a group setting contributes to the social-emotional bonding of members and the group's overall success?
(a) Facilitative/building role (b) Individualizing
(c) Maintenance (d) Blocking

238. "To understand communication in a meeting, we need to investigate the roles, personalities and values of every participant, as well as review the minutes taken and actions resulting from previous meetings." Which of Trenholm's perspectives is described here?
(a) Socio-phychological (b) Cybernetic
(c) Psychosocial (d) Pragmatic

239. What term did Lengl and Daft use for failure when face-to-face talking is used to convey routine messages?
(a) Data richness (b) Channel richness (c) Data processing (d) Data glut

240. What is redundancy in messages?
(a) Information that recipient has already receive
(b) Extra information to persuade the receiver to accept and act upon the message
(c) Parts of the message that have no meaning and could be eliminated
(d) Message that have no purpose and need not be retained

241. According to the text, why should more attention be given to training in listening to oral communication?
(a) Responsibility for effective communication is usually assigned to the sender
(b) Evaluating the speaker seems easier than evaluating the audience
(c) Presentation Is thought of as a one way process
(d) All of the above

242. Which of the following was presented as a listening skill?
(a) Use open-ended question
(b) Hold feedback until it is asked for
(c) Concentrate on the whole message, not just the highlights
(d) None of the these items

243. Which of the factors listed below is not a reason for decision making in organizations being a complex process?
(a) People have to make decisions in a historical context
(b) Several stakeholders will have an interest in the decision
(c) Modern information systems enable people to evaluate a range of possible

outcomes
(d) Factors in the current context of the organization affect the decision

244. The overall process of decision making in, for example, staff selection includes which of these stages?
(a) Deciding which candidate to appoint
(b) Identifying the need for a new member of staff
(c) Agreeing the job specification
(d) All of the above

245. A manager who is helping a customer return some shoes they purchased last week is dealing with what type of decision?
(a) Non-programmed decision (b) Uncertainty
(c) Bounded rationality (d) Programmed decision

246. A solution to a problem that is arrived at through an unstructured process of decision making is called a.....
(a) Bounded rationality (b) Non-programmed decision
(c) Programmed decision (d) Uncertainty

247. As a manager moves to higher positions in an organisation the ability to make _____ becomes _____ important.
(a) Non-programmed; more (b) Programmed; more
(c) Non-programmed; less (d) Programmed; much more

248. If a manager at SAIL wants to award a contract for printing the company's promotional literature and has obtained quotations from several printers, the manager can select a printer and know with _____ what the printing should cost.
(a) Ambiguity (b) Risk (c) Uncertainty (d) Certainty

249. In Herbert Simon's theory, a manager who accepts the first satisfactory solution to a problem has made a _____ decision, while a manager who continues to search for the best possible solution is seeking to find a _____ decision
(a) Maximising; satisficing (b) Minimising; maximizing
(c) Satisficing; maximizing (d) Maximising; minimizing

250. The decision making model which emphasises that organisations contain diverse interest groups who will bargain about goals and alternative actions, often with incomplete information is known as the.....

(a) Inspirational or garbage can model (b) Political model
(c) Administrative or incremental model (d) Computational and rational model

251. Which of the following is not among the reasons for complexity of decisions?
(a) Individuals have different risk propensities.
(b) There are many criteria for making choices.
(c) Decisions have immediate, short-term impact.
(d) Managers often share decisions.

252. Max Weber, a German sociologist, showed particular concern for
(a) social structures (b) flexible structures
(c) bureaucratic structures (d) personalised structures

252. In the context of decision making, which of the following best describes a heuristic?
(a) A rule that a person relies upon to assess or categorise choices.
(b) One of many personal learned rules that a person applies in the process of decision making.
(c) A fixed set of internal rules that a person uses when making a decision.
(d) An attitude that prefers to look at a question as a whole.

253. The company announcement: SUCCESFUL SALE OF PLANT: 75 PER CENT OF 1,000 JOBS TO BE SAVED! The local newspaper headline: 250 JOBS TO GO AT PROCESSING PLANT What is illustrated here?
(a) Availability heuristic (b) Judgemental bias
(c) Overconfidence (d) Framing error

254. Which of the following best expresses the difference between programmed and non-programmed decisions?
(a) Occur under certainty or risk; occur under uncertainty or ambiguity
(b) Made by managers who prefer a thinking or technocratic style; made by managers who use judgement and follow intuition
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259. A variation of the electronic meeting that links together media from different locations is _____
(a) E-commerce (b) The Delphi technique
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260. ____ plans have clearly defined objectives.
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261. Who studied the nature of specific jobs, and broke the tasks into basic work units with the end result providing the one right way to perform the job?
(a) Douglas M. McGregor (b) Frederick W. Taylor
(c) Henry L. Gantt (d) Henry L. Gantt

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(a) Top Manager (b) Middle Manager (c) First Line Manager (d) Team Leader

263. The Hawthorne studies:
(a) Found that to increase worker efficiency, management must analyze and minimize the motions required to complete a task.
(b) Found that when workers know they are being watched, their productivity increases.
(c) Found that a worker is inherently lazy and will use any excuse not to perform their duties.
(d) Found that workers accept a managerial directive only if it is acceptable in terms of their personal interests.

264. The Behavioral approach to management focused on:
(a) The worker (b) The manager (c) The owner (d) None of the above.

265. The external environment factor that states: The values and culture that affect

demand?
(a) associative models (b) exponential smoothing
(c) weighted moving average (d) time series

203. The fundamental difference between cycles and seasonality is the
(a) duration of the repeating patterns (b) magnitude of the variation
(c) ability to attribute the pattern to a cause (d) all of the above

204. Increasing the number of periods in a moving average will accomplish greater smoothing, but at the expense of.....
(a) manager understanding (b) accuracy
(c) stability (d) responsiveness to changes

205. Organizational structure is made up of key elements. Which of the following is not one of these elements?
(a) Span of control (b) Centralization
(c) Decentralization (d) Co-ordination

206. Which of the following is one of the six key elements a manager needs to consider when designing an organization s structure?
(a) Job design (b) Work specialization
(c) Feminine organization (d) Eliminating chain of command

207. One of the most popular ways to group activities is by.....
(a) Product (b) Function (c) Process (d) Geography

208. Sun Petroleum Products departmentalizes by fuels, lubricants, and waxes and chemicals. This is an example of departmentalization by.....
(a) Product (b) Functions (c) Job design (d) Customer

209. Which type of departmentalization achieves economies of scale by placing people with common skills and orientations into common units?
(a) Geographic (b) Product (c) Process (d) Functional

210. When jobs are grouped together based on a particular type of customer, this is known as.....
(a) Job structuring (b) Formalization
(c) Centralization (d) Departmentalization

211. Which of the following trends is gaining momentum?
(a) Using less departmentalization
(b) Geographical departmentalization

(c) Using only one type of departmentalization
(d) Using more customer departmentalization

212. The unbroken line of authority that extends from the top of the organization to the lowest echelon and clarifies who reports to whom is termed.....
(a) Unity of command (b) Authority
(c) Power and authority structure (d) Chain of command

213. What is span of control?
(a) empowering lower-level employees
(b) concentrating decision-making on one specific point in the organization
(c) centralization
(d) number of subordinates a manager can effectively direct

214. Centralization refers to.....
(a) The degree to which decision-making is concentrated at a single point in the organization
(b) The development and maintenance of power in the organization (c) The decision-making process
(d) The geographic dispersion of an organization

215. In an organization that has high centralization.....
(a) Problem can be quickly and efficiently solved
(b) The corporate headquarters is located centrally to branch offices
(c) Top managers make all the decisions-lower-level managers merely carry out directions
(d) All top-level officials are located within the same geographic area

216. The degree to which jobs within an organization are standardized is referred to as.....
(a) job variation (b) routineness (c) formalization (d) centralization

217. In a highly formalized organization, job behaviours are relatively
(a) Non programmed (b) Non-existent
(c) Programmed (d) Discretionary

218. Employee discretion is inversely related to.....
(a) Centralization (b) Standardization (c) Complexity (d) Decentralization

219. Which of the following structures is characterized by centralization, high formalization, extensive departmentalization, and a limited information network?

(a) Technology model (b) Mechanistic model
(c) Job satisfaction model (d) Organic model

220. If there is low formalization, a comprehensive information network and high participation in decisionmaking, one would expect.....
(a) A mechanistic structure (b) A typical government organization
(c) A stable structure (d) An organic structure

221. Which of the following is characterized by wide spans of control, little formalization, a low degree of departmentalization, and authority centralized in a single person.....
(a) Bureaucracy (b) Simple structure
(c) Matrix organization (d) Mechanistic structure

222. Which organization is characterized by very formal rules, centralized authority, and narrow spans of control?
(a) Boundaryless (b) Matrix (c) Virtual (d) Bureaucracy

223. The matrix structure combines which two forms of departmentalization?
(a) Simple And functional (b) Functional and product
(c) Virtual and team (d) Product and organic

224. Which of the following problems is most likely to occur in a matrix structure?
(a) Decreased employee motivation
(b) Employees receiving conflicting directives
(c) Decreased response to environmental change
(d) Decreased coordination

225. Which structure breaks down departmental barriers and decentralizes decision-making to the level of the work team?
(a) Boudaryless (b) Feminine (c) Team (d) Virtual

226. Which type of organization outsources major business functions?
(a) Modular (b) Innovation (c) Virtual (d) Feminine

227. The innovation strategy is characterized by.....
(a) A mixture of loose with tight properties
(b) Looser controls for new undertakings
(c) Low specialization and low formalization
(d) Tight controls over current activity

228. A continually evolving network of independent companies, suppliers, customers, even competitors, linked together to share skills, costs, and access

to one another's markets is called a/an.....

(a) Virtual organization (b) Boundary-less organization
(c) Modular organization (d) Integrated organization

229. An organization that seeks to eliminate the chain of command, have limitless spans of control, and replace departments with empowered teams is called a/an.....

(a) Cooperative organization (b) Virtual organization ;
(c) Boundaryless organization (d) Modular organization

230. Which dimension of an organization s environment refers to the degree to which it can support growth?

(a) Volatility (b) Technology (c) Capacity (d) Complexity

231. Neoclassical economics concerns itself with the determination of various prices. In the branch of Microeconomics, economists are concerned with _____, while in Macroeconomics they consider _____

(a) Price rises: price falls
(b) Real prices: nominal prices
(c) Individual product prices: the aggregate price level
(d) Costs to consumers: costs to producer

232. During the downturn portion of a business cycle, the economy is characterized by

(a) rising unemployment and rising investment
(b) falling unemployment and falling output
(c) rising profits and falling wages
(d) falling output and rising unemployment

233. Changes in behavior as a result of observation and manipulation of conditions in an environment are termed.....

(a) The Hawthorne effect (b) Group dynamic
(c) Social influence (d) Sociometry

234. Members within a group that share similar experiences and feelings are known to have..... An important factor of the preplanning stage in group dynamics is determining what the group is to accomplish; this is known as.....

(a) Goal setting (b) Cohesion (c) Clarity of purpose (d) Group orientation

235. .....Groups have members who have similar presenting problems or are similar in gender, ethnicity, or social backgroun(d)

(a) Heterogeneous (b) Ideal (c) Dynamic (d) Homogeneous

236. Role _____ is a conflict between the role an individual has outside the group and the role he or she is expected to have in the group.

(a) Collision (b) Transition (c) Confusion (d) Incompatibility

237. Which role in a group setting contributes to the social-emotional bonding o members and the group's overall success?

(a) Facilitative/building role (b) Individualizing
(c) Maintenance (d) Blocking

238. "To understand communication in a meeting, we need to investigate the roles personalities and values of every participant, as well as review the minutes taken and actions resulting from previous meetings." Which of Trenholm's perspectives is described here?

(a) Socio-phychological (b) Cybernetic
(c) Psychosocial (d) Pragmatic

239. What term did Lengl and Daft use for failure when face-to-face talking is used to convey routine messages?

(a) Data richness (b) Channel richness (c) Data processing (d) Data glut

240. What is redundancy in messages?

(a) Information that recipient has already receive
(b) Extra information to persuade the receiver to accept and act upon the message
(c) Parts of the message that have no meaning and could be eliminated
(d) Message that have no purpose and need not be retained

241. According to the text, why should more attention be given to training in listening to oral communication?

(a) Responsibility for effective communication is usually assigned to the sender
(b) Evaluating the speaker seems easier than evaluating the audience
(c) Presentation Is thought of as a one way process
(d) All of the above

242. Which of the following was presented as a listening skill?

(a) Use open-ended question
(b) Hold feedback until it is asked for
(c) Concentrate on the whole message, not just the highlights
(d) None of the these items

243. Which of the factors listed below is not a reason for decision making in organizations being a complex process?

(a) People have to make decisions in a historical context
(b) Several stakeholders will have an interest in the decision
(c) Modern information systems enable people to evaluate a range of possible

outcomes
(d) Factors in the current context of the organization affect the decision

244. The overall process of decision making in, for example, staff selection includes which of these stages?
(a) Deciding which candidate to appoint
(b) Identifying the need for a new member of staff
(c) Agreeing the job specification
(d) All of the above

245. A manager who is helping a customer return some shoes they purchased last week is dealing with what type of decision?
(a) Non-programmed decision (b) Uncertainty
(c) Bounded rationality (d) Programmed decision

246. A solution to a problem that is arrived at through an unstructured process of decision making is called a.....
(a) Bounded rationality (b) Non-programmed decision
(c) Programmed decision (d) Uncertainty

247. As a manager moves to higher positions in an organisation the ability to make _____ becomes _____ important.
(a) Non-programmed; more (b) Programmed; more
(c) Non-programmed; less (d) Programmed; much more

248. If a manager at SAIL wants to award a contract for printing the company's promotional literature and has obtained quotations from several printers, the manager can select a printer and know with _____ what the printing should cost.
(a) Ambiguity (b) Risk (c) Uncertainty (d) Certainty

249. In Herbert Simon's theory, a manager who accepts the first satisfactory solution to a problem has made a _____ decision, while a manager who continues to search for the best possible solution is seeking to find a _____ decision
(a) Maximising; satisficing (b) Minimising; maximizing
(c) Satisficing; maximizing (d) Maximising; minimizing

250. The decision making model which emphasises that organisations contain diverse interest groups who will bargain about goals and alternative actions, often with incomplete information is known as the.....

(a) Inspirational or garbage can model (b) Political model
(c) Administrative or incremental model (d) Computational and rational model

251. Which of the following is not among the reasons for complexity of decisions?
(a) Individuals have different risk propensities.
(b) There are many criteria for making choices.
(c) Decisions have immediate, short-term impact.
(d) Managers often share decisions.

252. Max Weber, a German sociologist, showed particular concern for
(a) social structures (b) flexible structures
(c) bureaucratic structures (d) personalised structures

252. In the context of decision making, which of the following best describes a heuristic?
(a) A rule that a person relies upon to assess or categorise choices.
(b) One of many personal learned rules that a person applies in the process of decision making.
(c) A fixed set of internal rules that a person uses when making a decision.
(d) An attitude that prefers to look at a question as a whole.

253. The company announcement: SUCCESFUL SALE OF PLANT: 75 PER CENT OF 1,000 JOBS TO BE SAVED! The local newspaper headline: 250 JOBS TO GO AT PROCESSING PLANT What is illustrated here?
(a) Availability heuristic (b) Judgemental bias
(c) Overconfidence (d) Framing error

254. Which of the following best expresses the difference between programmed. and non-programmed decisions?
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265. The external environment factor that states: The values and culture that affect the way people feel about the organization they are in and about work itsel is:
(a) Sociological factors (b) Political factors
(c) Economic factors (d) Psychological factors

266. The external environment factor that includes: Factors that have a les immediate effect on a business such as the nation's rate of inflation o recession, unemployment rate, or standard of living, is
(a) Political factors (b) Sociological factors
(c) Indirect economic factors (d) Direct economic factors

267. The resources within an organization, used to achieve its goal, make up th _____ of a business.
(a) External environment (b) Internal environment
(c) Social responsibility (d) Workers motivation

268. Strategic planning:
(a) Addresses the organization's basic mission or business, issuing broad statement of purpose or direction that have a long lead time.
(b) Involves managers in each unit of an organization who are responsible fc achieving the unit's objectives within a specified period of time.
(c) Looks specifically at resources, finances, and market conditions to determin ways to accomplish the overall plans of the organization.
(d) Determines the day-to-day operations within an organization.

269. GAP analysis:
(a) Is a planning approach for determining where an organization as today.
(b) Is a planning approach for determining how an organization will reach its goal
(c) Provides a diagram showing a company's present momentum and its potenti
(d) All of the above.

270. The SWOT approach assesses an organization's
(a) Speed, Wants, Order, Timing
(b) Structure, Workforce, Organization, Types
(c) Strengths, Weaknesses, Opportunities, Threats.
(d) Signs, Worries, Objectives, Techniques

271. _____ is the process of using the resources and personnel of organization in an orderly way to achieve the objectives and long-term go of the organization.
(a) Planning (b) Organizing (c) Leading (c) Controllin

272. Which of the following is the most common type of departmentalization?

(a) Customer/Market Departmentalization
(b) Function Departmentalization
(c) Geography Departmentalization
(c) Process Departmentalization

273. A manufacturing company has divided its departments into pattern making, fabric cutting, and fabric coloring. What type of departmentalization is this?
(a) Geography Departmentalization (b) Process Departmentalization
(c) Matrix/Project Departmentalization (d) Function Departmentalization

274. A _____ organizational structure is the simplest form and has clear lines of authority and ease of decision making.
(a) Horizontal (b) Line (c) Vertical (d) Staff

275. The management of people/labor should be handled by what department in an organization?
(a) Administration (b) Human Resources
(c) Information Systems (d) Accounting

276. When a candidate for a position is asked general, open-ended job related questions, they are experiencing what type of interview?
(a) Unstructured Interview (b) Relaxed Interview
(c) Unorganized Interview (d) Structured Interview

277. Which of the following is NOT a major influence on the rate of compensation?
(a) Competition (b) Voluntary retirement (c) Laws (d) Unions

278. Which type of separation is most unpleasant for an employee?
(a) Termination (b) Mandatory retirement
(c) Voluntary retirement (d) Resignation

279. Leadership can _____ subordinates to help the organization achieve its goals.
(a) Motivate (b) Communicate (c) Direct (d) All of the above

280. Which source of power is based on an individual's knowledge, special skills, abilities, or previous experience?
(a) Referent power (b) Expert power
(c) Referent power (d) Legitimate power

281. Which source of power is based on a manager's ability to punish a subordinate?
(a) Coercive power (b) Referent power

(c) Rewarded power (d) Legitimate power

282. A budget is what type of control?
(a) Standard (b) Process (c) Division (d) Financial

283. The theory that an individual tends to act in a certain way, with the expectation that the act will be followed by a given outcome and according to the attractiveness of the outcome is _____.
(a) Equity theory (b) Three-needs theory
(c) Motivation-hygiene theory (d) Expectancy theory

284. Leaders who inspire followers to transcend their own self-interests for the good of the organization, and are capable of having a profound and extraordinary effect on followers are _____ leaders.
(a) Transactional (b) Transformational
(c) Democratic (d) Autocratic

285. A group of employees with expertise in a variety of specialty areas who are brought together to work on a project or specific activity is a:
(a) Cross functional team (b) Self-managed team
(c) Virtual team (d) Problem-solving team

286. _____ is the power to give positive benefits or rewards.
(a) Expert power (b) Reward power
(c) Legitimate power (d) Coercive power

287. The final step of the strategic management process is _____.
(a) Doing an internal analysis (b) Formulating strategies
(c) Implementing strategies (d) Evaluating results

288. A/An _____ is a formal evaluation of an organization's financial statements, performed either by an outside accounting firm or by an internal department.
(a) Revenue operating budget (b) Incident log
(c) Financial audit (d) Balance sheet budget

289. In a PERT network, slack time is _____.
(a) The end point that represents the completion of a major activity
(b) The time or resources required to progress from one event to another
(c) The amount of time an individual activity can be delayed without delaying the whole Project
(d) The longest or most time-consuming sequence of events and activities

290. **Which type of decision making is carried out by lower level management and deals with specific day-to-day processes?**
(a) Programmed decision making (b) Operational decision making
(c) Administrative decision making (d) Mid-level decision making

291. **_____ involves allocating resources by detailing what activities haveto be done, the order in which they are to be completed, who is to do each, and when they are to be complete(d)**
(a) Benchmarking (b) Budgeting
(c) Scheduling (d) Competitor intelligence

292. **When a subordinate or lower level manager passes information or offers suggestions to higher level management, they're using which level of communication?**
(a) Upward communication (b) Downward communication
(c) Lateral communication (d) Diagonal communication

293. **If a solution to a particular problem is not vital to the functioning of an organization and management is willing to overlook the causes of the conflict, managers may choose to use which type of conflict resolution?**
(a) Confrontation (b) Avoidance (c) Dominance (d) Compromise

294. **Which of the following statements would a Theory X manager consider to be true?**
(a) The average person can learn to accept and even seek responsibility
(b) Employees will shirk responsibility
(c) Employees will exercise self-direction if they are committed to the objectives
(d) Employees view work as being as natural as play

295. **A short letter written to a potential employer with a resume attached is known as a**
(a) Introduction letter (b) Cover letter
(c) Interview letter (d) Ice-breaker letter

296. **_____ is the process of getting results accomplished through others.**
(a) Ordering (b) Mandating (c) Delegating (d) Working

297. **What is the term used to define the number of subordinates directly controlled by a manager?**
(a) Division management (b) Departmentation
(c) Investment span (d) Span of management

298. **Which management theorist is responsible for the motivation-hygiene theory?**
(a) Abraham Maslow (b) Dale Hawthorne
(c) Peter Drucker (d) Frederick Herzberg

299. **What kind of organizational structure combines a vertical chain of command with horizontal reporting requirements?**
(a) Line authority (b) Matrix (c) Functional (d) Line-and-staff

300. **What kind of training program is most appropriate for a simple task?**
(a) On-the-job training (b) vestibule training
(c) laboratory training (d) job rotation

301. **Which leadership theory suggests that management style should adapt itself to changing circumstances?**
(a) Contingency theory (b) Delegation theory
(c) Autocratic theory (d) Participatory theory

302. **According to Abraham Maslow, the most elevated type of need is _____.**
(a) Self-actualization (b) Physiological
(c) Esteem (d) Safety

303. **Mr. (A) is a manager in a manufacturing company, he attempts to establish a culture of quality affecting the attitudes and actions of every employee and relies on a workforce that wants to improve quality. He focuses on establishing**
(a) Total Quality Management (b) Knowledge management
(c) Operations Management (d) Management of Information System

304. **Ali is working in XYZ Company; he desires to get himself secure from crimes company layoffs and other adverse impacts. We can say that he fulfils the – _____ need.**
(a) Self Actualization (b) Social need (c) Esteem (d) Safety

305. **In _____ theory management assumes that employees may be ambitious, self-motivated, and anxious to accept greater responsibility, and exercise self-control, self-direction, autonomy and empowerment.**
(a) Theory Y manager (b) Theory X manager
(c) Theory Z manager (d) All of the above

306. **_____ roles involve people and other duties that are ceremonial and symbolic in nature.**
(a) Informational. (b) Interpersonal.
(c) Decisional. (d) All of the given options.

307. **_____ is the use of scientific method to define the "one best way for a job to be done.**
(a) Scientific management (b) Bureaucratic management

(c) Administrative management (d) Management

308. The planning process can be used to promote _____ inorganization
(a) Advancement (b) Technologies (c) Innovation (d) Discoveries

309. The study of people in relation to their fellow human beings is _____
(a) Psychology (b) Sociology
(c) Anthropology (d) All of the given options

310. Which management concept suggests that low-importance decisions be handled by subordinates, so that managers can focus on high-importance decisions?
(a) management by objective (b) management by exception
(c) Participatory management (d) inclusionary management

311. Getting work done with a minimum of effort, expense or waste is the definition of _____
(a) Effectiveness. (b) Management (c) Planning. (d) Efficiency

312. _____ are mathematical models that describe the operating characteristics of queuing situations.
(a) Waiting line models (b) Simulation models
(c) Decision trees (d) All of the given options

313. Managers having the least authority and are at the lowest level in the hierarchy of the organization are called_____
(a) Middle level managers (b) Top level managers
(c) First-line managers (d) None of the given options

314. _____ reduces uncertainty
(a) Negotiating (b) Planning (c) Organizing (d) Leading

315. Decision makers face _____ types of problems.
(a) 2 (b) 3 (c) 4 (d) 5

316. _____ are those plans that are extended beyond three years.
(a) Short Term Plans (b) Long Term Plans
(c) Specific Plans (d) Strategic Plans

317. _____ need involves the desire to affiliate with and be accepted by others.
(a) Esteem b) Belongingness (c) Safety (d) Self-Actualization

318. _____ is the recording system which enables sender to leave messages for receiver by telephone.
(a) E-Mail (b) Voice Mail (c) Videoconferencing (d) Teleconferencing

319. A motivational approach in which an organization s financial statements are opened to and shared with all of the employees is called _____
(a) Open Book Management (b) Pay for Performance Program
(c) Reinforcement Theory (d) Feedback

320. A _____ refers to the authority and responsibility for achieving the major goals of the Organization.
(a) Line position (b) Staff position
(c) Line authority (d) None of the given options

321. _____ maintains self developed network of outside contacts and informers who provide favors and information.
(a) Entrepreneur (b) Monitor (c) Liaison (d) Figurehead

322. _____ is the planning and implementing of organizational systems and practices that maximize the potential of employees to contribute to organizational goals and develop their capabilities unhindered by group identities such as race, gender, age, or ethnic group.
(a) Managing Diversity (b) Anthropology
(c) Bureaucracy (d) Remuneration

323. Seema desires for friendship, love, and a sense of belonging, we can say that she fulfils the_____
(a) Physical need (b) Self Actualization (c) Social need (d) Esteem

324. _____ is a condition in which the decision maker chooses a course of action without complete knowledge of the consequences that will follow implementation.
(a) Risk (b) Uncertainty (c) Ambiguity (d) Accuracy

325. NAFTA stands for:
(a) North American Free Trade Agreement
(b) North Asian Free Trade Agreement
(c) North American Free Trade Association
(d) None of the given options

326. Which one of the following is not the characteristic of Weber s ideal bureaucracy?

(a) Specialization of labor
(b) Formalization of rules
(c) Division of labour
(d) Formalization of links authority into a hierarchical structure

327. _____shows the management structure of an organization.
(a) Hierarchy (b) Decision Tree
(c) Incremental Model (d) Satisfying model

328. If the average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition and wants security above all, the management attitude would be:
(a) Theory Y manager (b) Theory X manager
(c) Theory Z manager (d) All of the given options

329. Getting work done with a minimum effort, expense, or waste is the definition of _____.
(a) Management (b) Planning (c) Efficiency (d) Effectiveness

330. Which of the following is not an argument for the assumption of social responsibility by business?
(a) Long-run profits (b) Stockholder interests
(c) Ethical obligations (d) Costs

331. _____ concluded that managers perform 10 interrelated activities that relate to decision making, using information and interpersonal relationships.
(a) Mintzberg (b) Abraham Maslow (c) Robert Owen (d) Henri Fayol

332. Scientific Management approach is developed by
(a) Elton Mayo (b) Henry Fayol (c) F.W. Taylor (d) (A) Maslow

333. Who proposed " bureaucratic structure" is suitable for all organization
(a) Elton Mayo (b) Henry Fayol (c) F.W. Taylor (d) Max Weber

334. Whose concept states that interpersonal and human relations may lead to productivity
(a) Elton Mayo (b) Henry Fayol (c) F.W. Taylor (d) Max Weber

335. Today s organization are
(a) Open system (b) Closed system
(c) Open as well as closed (d) None of these

336. Which of the following methods is/are used to solve intergroup conflicts indirectly
(a) Avoidance (b) Encouragement
(c) Bargaining (d) All of these

337. Which of the following is / are not direct method to solve intergroup conflict
(a) Problem solving (b) Domination by the management
(c) Removing key figures in conflict (d) Persuasion

338. A technique to bring changes in the entire organization, rather man focusin attention on individuals to bring changes easily.
(a) Organizational development (b) Organizational change
(c) Organizational culture (d) Organizational conflicts

339. Which of the following is/are OD intervention techniques
(a) Sensitivity training (b) MBO
(c) Quality of work life (d) All the above

340. Which of the following is NOT an important issue relating to goal-settin theory?
(a) Goal specificity (b) Equity among workers
(c) Feedback (d) Defining the goal

341. Behaviour, power, and conflict are central areas of study for _____
(a) Sociologist (b) Anthropologists
(c) Social psychologists (d) Operations analysts

342. The managers of a multinational company are located in France, India, Brazil and the United States. Which decision-making technique seems mos reasonable for this organization?
(a) A postal service interaction (b) A brainstorming session
(c) A nominal discussion (d) An electronic meeting

343. According to Robert Katz, when managers have the mental ability to analyz and diagnose complex situations, they possess _____ skills.
(a) Technical (b) Leadership (c) Problem-solving (d) Conceptual

344. What sort of goals does Management By Objectives (MBO) emphasize?
(a) Tangible, verifiable and measurable
(b) Achievable, controllable and profitable
(c) Challenging, emotional and constructive
(d) Hierarchical, attainable and effective

345. **Today s managers understand that the success of any effort at improving quality and productivity must include _____.**
(a) Quality management programs (b) Customer service improvements
(c) Employee's participation (d) Manufacturing simplification

346. **Which of the following would be least likely to pose a barrier to cross-cultural communications?**
(a) Tone difference (b) Word connotations
(c) Political correctness (d) Differences among perceptions

347. **Concept of MBO was introduced by:**
(a) Peter. F.Drucker (b) Mary Parker
(c) Henry Fayol (d) Philip Kotler

348. **People with which type of personality trait commonly make poor decisions because they make them too fast?**
(a) Type As (b) Type Bs (c) Self-monitors (d) Extroverts

349. **Which of the following is an environmental force that shapes personality?**
(a) Gender (b) Height (c) Experience (d) Brain size

350. **Which of the following leadership behaviours are identified by the path-goal theory?**
(a) Supportive, employee-oriented, laissez-faire and participative
(b) Achievement-oriented, supportive, humanistic, and directive
(c) Participative, achievement-oriented, directive, and supportive
(d) Directive, participative, supportive, and laissez-faire

351. **In which stage of the conflict process does conflict become visible?**
(a) Illumination (b) Intentions (c) Behaviour (d) Cognition

352. **_____ refers to the network of personal and social relations that is developed spontaneously between people associated with each other.**
(a) Formal organization (b) Informal organization
(c) Business organization (d) Government organization

353. **What sort of actions is most likely to be attributed to external causes?**
(a) Actions that have high distinctiveness, high consensus and high consistency
(b) Actions that have high distinctiveness, high consensus and low consistency
(c) Actions that have high distinctiveness, low consensus and low consistency
(d) Actions that have low distinctiveness, low consistency and high consensus

354. **A threatened strike action by a labour union to force the management to accept their demands is an example of which of the following power?**
(a) Referent power (b) legitimate power
(c) Reward power (d) Coercive power

355. **Which of the following departmentalization can be considered necessary in an organization where the Company s products fall into several categories with very different production methods for each category?**
(a) Customer (b) Production (c) Process (d) Matrix

356. **Which of the following is most likely to be a belief held by a successful manager?**
(a) Technical knowledge is all that is needed for success.
(b) It is not essential to have sound interpersonal skills.
(c) Technical skills are necessary, but insufficient alone for success.
(d) Effectiveness is not impacted by human behavior.

357. **Which of the following is not one of the four primary management functions?**
(a) Controlling (b) Planning (c) Staffing (d) Organizing

358. **Determining how tasks are to be grouped is part of which management function?**
(a) Planning (b) Leading (c) Controlling (d) Organizing

359. **_____ is discretionary behaviour that is not part of an employee s formal job requirement, but that promotes the effective functioning of the organization.**
(a) Productivity (b) Motivation
(c) Organizational citizenship (d) Organizational behavior

360. **Individual-level independent variables include all of the following except**
(a) Leadership (b) Learning (c) Perception (d) Motivation

361. **Which of the following is not true of classical conditioning?**
(a) Classical conditioning is passive.
(b) Classical conditioning can explain simple reflexive behaviors.
(c) Learning a conditioned response involves building an association between a conditioned stimulus and an unconditioned stimulus.
(d) A neutral stimulus takes on the properties of a conditioned stimulus.

362. **What is the process by which individuals organize and interpret their sensory impressions in order to give meaning to their environment?**
(a) Interpretation (b) environmental analysis
(c) Outlook (d) Perception

363. **Two people see the same thing at the same time yet interpret it differently. Where do the factors that operate to shape their dissimilar perceptions reside?**
(a) the perceivers (b) the target (c) the timing (d) the context

364. **.....is the dynamic organization within the individual that determine his unique adjustment to the environment**
(a) Perception (b) Attitude (c) Behavior (d) Personality

365. **Which of the following is not an attribute of psychological individual difference?**
(a) Motivation (b) Learning (c) Personality (d) Complexion

366. **Select the correct hierarchical order of qualities of an individual**
(a) Ability-Skills- Aptitude- Competency (b)Aptitude-Ability- Skills- Competency
(c) Skills- Aptitude- Competency- Ability (d) Competency-Ability-Skills- Aptitude

367. **Maslow s "basic needs" are also known as**
(a) Social needs (b) Esteem needs (c) Safety needs (d) Physiological needs

368. **In Maslow s Need hierarchy which needs are shown between Esteem needs and Safety needs**
(a) Social needs (b) Esteem needs (c) Security needs (d) Basic need

369. **ERG theory of motivation was proposed by**
(a) Maslow (b) F. Herzberg (c) Alderfer (d) Mc Gregor

370. **Under ERG theory, "R" stands for————**
(a) Rationality (b) Responsibility (c) Remuneration (d) Relatedness

371. **Dual structure approach of motivation is developed by**
(a) Maslow (b) F. Herzberg (c) Alderfer (d) Mc Gregor

372. **Under Herzberg s theory, factors causing dissatisfaction is called**
(a) Demotivators (b) Negative stimuli (c) Hygiene factors (d) Defectors

373. **Hygiene factors are**
(a) Satisfiers (b) Maintenance factors
(c) Defectors (d) All of these

374. **In Two Factor theory, "Salary" coming under ————**
(a) Satisfiers (b) Maintenance factors
(c) Both of these (d) None of above a and b

375. **Who propounded X and Y theory of motivation**
(a) Maslow (b) F. Herzberg (c) Alderfer (d) Mc Gregor

376. **————— theory believes that employees dislike work**
(a) X theory (b) Y theory (c) Z theory (d) None of these

377. **According to ————employees love work as play or rest**
(a) X theory (b) Y theory (c) Z theory (d) None of these

378. **Z theory is a Japanese approach of motivation developed by**
(a) Mc Clelland (b) William Ouchi (c) Alderfer (d) Mc Gregor

379. **According to ————— the managers and workers should work together as partners and of equal importance for the organizations success**
(a) X theory (b) Y theory (c) Z theory (d) 2 Factor theory

380. **Which one is not a Process Based Theory of motivation?**
(a) Porter Lawler theory (b) Mc Clelland's theory
(c) Stacy Adams theory (d) Vroom's theory

381. **Who developed Equity theory of motivation?**
(a) Porter Lawler (b) Mc Clelland (c) Stacy Adams (d) Vroom

382. **Porter Lawler Model is an extension of**
(a) Maslow's theory (b) Mc Clelland's theory
(c) Stacy Adams theory (d) Vroom's theory

383. **Believes, attitudes, traditions and expectations which are shared by group members is called**
(a) Group norms (b) Group communication
(c) Group cohesiveness (d) Group structure

384. **————————is the ability of influencing people to strive willingly for mutual objectives**
(a) Motivation (b) Control (c) Leadership (c) Supervision

385. **————leadership emphasize on rules and regulation in an organization**
(a) Democratic (b) Autocratic (c) Laissez-faire (d) Bureaucratic

386. **———— leader is self confident and can attract followers by his great influence**
(a) Charismatic (b) Autocratic (c) Laissez-faire (d) Bureaucratic

387. **Which one of the following is/are leadership theories?**
(a) Trait theory (b) Behavior theory (c) Contingency theory (d) All of these

388. **Least Preferred Co-worker (LPC) model of leadership was developed by**
(a) Martin Evans (b) Robert House
(c) Fred Fielder (d) Whetton

389. **Path-goal model of Leadership was introduced by**
(a) Martin Evans & Robert House (b) Fred Fielder
(c) Whetton (d) Cameron

390. **Which of the following is not a contingency theory of leadership**
(a) LPC theory (b) Path Goal theory
(c) Vroom-Yetton-Jago theory (d) Job centered Leadership

391. **Which one of the following characteristics is part of the definition of a group?**
(a) unstable relationship (b) interdependent effort
(c) personal accountability (d) independent behaviour

392. **While business firms have traditionally been organized around _____, athletic groups have long recognized the importance of _____.**
(a) work groups; individuals (b) management; individuals
(c) groups; teamwork(d) individuals; teamwork

393. **All of the following statements help to explain the current popularity of teams except.....**
(a) Teams can quickly assemble, deploy, refocus and disband
(b) Teams are more flexible and responsive to changing events
(c) Teams typically outperform individuals when tasks require multiple skills, judgment, and experience
(d) Teams expertly focus on individual performance.

394. **You are a member of a work team whose goal is to improve the efficiency of the production process. Your team is best described as:**
(a) Production-oriented. (b) Goal-oriented.
(c) Problem-solving. (d) Self-managed.

395. **Work groups of employees and supervisors that meet regularly to discuss their quality problems and recommend solutions is a form of participative management called:**
(a) Goal-oriented teams. (b) Quality circles.
(c) Department teams. (d) cooperative groups

396. **Self-managed work teams are generally:**
(a) Groups of employees who take on the responsibilities of their former supervisors.
(b) Those who meet weekly to discuss ways of improving quality, efficiency, and work environment.
(c) From different work areas, but at similar hierarchical levels, who work together to accomplish tasks.
(d) Employees who take on responsibilities for other employees unable to make decisions.

397. **_____ teams are employees from about the same hierarchical level, but from different work areas, who come together to accomplish a task.**
(a) Work-related (b) Self-managed
(c) Cross-functional (d) Problem-solving

398. **Which of the following is not useful in building trust?**
(a) demonstrate that you're working for others' interests as well as your own
(b) demonstrate competence
(c) Maintain confidences.
(d) Keep your feelings to yourself.

399. **The stages of group development are:**
(a) initiating, storming, norming, performing, adjourning
(b) introduction, high productivity, decline
(c) Initiation, evolution, maturation, and decline.
(d) Forming, storming, norming, performing, adjourning.

400. **In the second stage of group development:**
(a) Close relationships are developed. (b) The job task is performed.
(c) intragroup conflict often occurs. (d) Group objectives are clearly formulated.

401. **After which stage of a group s development has the group formed a common set of expectations of member behaviours?**
(a) Performing (b) planning (c) norming (d) stormin

402. **In order to reinforce team effort and commitment, managers should consider the use of:**
(a) fixed hourly wages. (b) flexible benefits
(c) rate individual piece plans (d) recognition and small financial rewards

403. **Successful teams translate their _____ into specific, measurable, and realistic performance goals.**
(a) Roles (b) norms (c) common purpose (d) skills

404. **_____ is reliability, predictability, and good judgment in handling situations.**
(a) Consistency (b) Openness (c) Loyalty (d) Integrit

405. **_____ is a characteristic of high performance teams where members believe in the integrity, character, and ability of each other**
(a) Trust (b) Openness (c) Loyalty (d) Worthiness

406. **The challenge of creating team players will be greatest where the national culture is:**
(a) competitive (b) collectivist (c) individualistic (d) pluralistic

407. **The challenge of creating teams is less demanding for management when teams are introduced where employees have strong _____ values**
(a) collectivist (b) competitive (c) pluralistic (d) cooperative

408. **When designing reward systems for teams, it is best to encourage cooperative efforts rather than _____ ones.**
(a) Collectivist (b) competitive (c) cooperative (d) individualistic

409. **If companies value teamwork, then promotions, pay raises, and other forms of recognition should be given to individuals for how effectively the work as:**
(a) individuals (b) team members (c) group members (d) leaders

410. **In our model of decision making under different conditions, what is the difference between risk and uncertainty?**
(a) Under risk, there is a well defined problem; under uncertainty, the definition is unclear
(b) Under risk, choices are clear and the chances of different outcomes can be measured; under uncertainty, neither applies.
(c) Under risk, probabilities can be measured; under uncertainty, they cannot.
(d) Under risk, information is reliable; under uncertainty, it is not.

411. **When a manager knows little about the intended goals of a decision and the outcomes of the options are unclear, what type of situation are they in?**
(a) Uncertainty (b) Risk (c) Certainty (d) Ambiguity

412. **The __ of a strategy specifies the range of markets in which an organization will compete**
(a) Scope (b) Distinctive Competency
(c) Resource deployment (d) Effective strategy

413. **When a manger made a decision and he is uncertain about the outcomes. H decision is likely to be:**
(a) Of Poor Quality (b) Unacceptable (c) Successful (d) Risky

414. **Which of the following BEST describes directional plans?**
(a) Flexible plans that set out general guidelines
(b) Stringent plans that establish specific directions
(c) Formal plans that provide the directions of how to assemble the product.
(d) General plans that allow the workers to change the schedule of production

415. **SWOT analysis divides organizational strengths into two categories; commo strength and__.**
(a) Strategic imitation (b) Competitive edge
(c) Competitive parity (d) Distinctive competencies

416. **Planning is often called the primary management function because it:**
(a) Offers some basis for future decision making
(b) Creates the vision for the organizational members
(c) Establishes the basis for all the other functions
(d) Sets the tone for the organizational culture

417. **The organization that has developed the capacity to continuously learn, adap and change is called:**
(a) Virtual organization (b) Learning organization
(c) Traditional organization (d) Bureaucratic organization

418. **Which of the following is important in effectively implementing the chose alternative in the decisionmaking process?**
(a) Getting upper-management support
(b) Double-checking your analysis for potential errors
(c) Allowing those impacted by the outcome to participate in the process
(d) Ignoring criticism concerning your chosen alternative

419. **Which one of the following individuals is most closely associated wit scientific management?**
(a) Frederick Taylor (b) Mary Parker Follett
(c) Harold Koontz (d) Max Weber

420. **A budget is an example of which of the following plan?**
(a) Strategic plan (b) Single use plan
(c) Informal plan (d) Standing plan

421. **Which of the following is best described as doing something differently and has been described as discontinuous or complementary change?**
(a) Entrepreneurship (b) Innovation (c) Variance (d) Enterprise

422. **First-line managers are responsible to report to:**
(a) Top level mangers (b) Middle-level mangers
(c) Supervisors (d) Operational mangers

423. **Low level management has a complete authority to make decisions in case of:**
(a) Centralization (b) Decentralization
(c) Scalar Chain (d) Order

424. **Nominal decision making is sometimes referred to as _____.**
(a) habitual decision making (b) routine decision making
(c) simple decision making (d) automatic decision making

425. **Which of the following analysis is mostly used for inventory control**
(a) lead time analysis (b) PERT analysis
(c) CPM analysis (d) ABC analysis

426. **In mining, manager, asst manger, supervisors should have proper understanding of technology related to statutory obligations to avoid which of the following conflict?**
(a) cognitive conflict (b) interest conflict
(c) values conflict (d) relationship conflict

427. **Which Scientist prefers "division of work" as one of his 14 management principle?**
(a) Henri Fayol (b) F W Taylor (c) Henry Gantt (d) Gilbreth

428. **It is of the commercial process that can make quicker deliveries to customers having very good impact on business health?**
(a) technology outsourcing (b) strategic management
(c) business outsourcing (d) business streamlining

429. **It is the group who develops mine map layers and digitizes associated mine map layers for all project areas**
(a) GC (b) HDI (c) SIA (d) GRG

430. **It is the model helps to understand behavior and structure of terrain indicating flow of water to decide escape route during mine inundation**
(a) MIS (b) GC (c) DEM (d) GPS

Answer Key

1	c	2	*	3	d	4	c	5	d	6	b
7	a	8	c	9	d	10	d	11	b	12	b
13	a	14	c	15	c	16	b	17	d	18	d
19	b	20	a	21	a	22	c	23	a	24	b
25	c	26	a	27	d	28	b	29	b	30	d
31	c	32	d	33	d	34	b	35	b	36	c
37	d	38	c	39	d	40	c	41	d	42	c
43	a	44	a	45	c	46	b	47	a	48	b
49	b	50	a	51	a	52	a	53	a	54	c
55	a	56	b	57	b	58	c	59	a	60	b
61	c	62	b	63	d	64	d	65	d	66	d
67	b	68	c	69	c	70	a	71	d	72	b
73	b	74	a	75	a	76	b	77	c	78	c
79	b	80	d	81	c	82	b	83	d	84	a
85	b	86	b	87	c	88	b	89	d	90	d
91	c	92	d	93	d	94	b	95	b	96	c
97	a	98	a	99	c	100	a	101	b	102	a
103	c	104	d	105	a	106	a	107	d	108	a
109	c	110	c	111	b	112	a	113	d	114	c
115	c	116	b	117	c	118	a	119	d	120	d
121	b	122	c	123	a	124	b	125	d	126	c
127	c	128	a	129	a	130	b	131	b	132	b
133	a	134	c	135	a	136	d	137	a	138	d
139	a	140	c	141	c	142	a	143	a	144	d
145	b	146	b	147	c	148	b	149	a	150	d
151	b	152	b	153	c	154	a	155	a	156	a
157	d	158	c	159	d	160	a	161	d	162	a
163	a	164	b	165	d	166	b	167	a	168	b
169	a	170	c	171	a	172	c	173	a	174	c
175	a	176	b	177	c	178	c	179	c	180	c
181	d	182	d	183	c	184	a	185	c	186	a
187	a	188	b	189	b	190	c	191	b	192	d
193	a	194	b	195	b	196	b	197	b	198	a
199	c	200	d	201	b	202	a	203	a	204	d
205	d	206	b	207	b	208	a	209	d	210	d
211	d	212	d	213	d	214	a	215	c	216	c
217	c	218	b	219	b	220	d	221	b	222	d
223	b	224	b	225	c	226	a	227	c	228	a
229	c	230	c	231	c	232	d	233	a	234	b
235	d	236	a	237	c	238	d	239	d	240	b
241	d	242	a	243	c	244	d	245	d	246	c
247	a	248	d	249	b	250	b	251	c	252	c
253	d	254	c	255	c	256	d	257	a	258	b
259	c	260	c	261	b	262	d	263	b	264	a
265	a	266	c	267	b	268	a	269	d	270	c
271	b	272	b	273	b	274	b	275	b	276	a
277	b	278	a	279	d	280	b	281	a	282	d

283	a	284	b	285	a	286	b	287	d	288	c
289	c	290	b	291	b	292	a	293	b	294	b
295	b	296	c	297	d	298	d	299	b	300	a
301	a	302	a	303	c	304	d	305	d	306	b
307	a	308	c	309	b	310	b	311	d	312	a
313	c	314	b	315	b	316	b	317	b	318	b
319	a	320	a	321	c	322	a	323	c	324	b
325	a	326	c	327	a	328	b	329	c	330	b
331	a	332	c	333	d	334	a	335	a	336	a
337	d	338	a	339	d	340	b	341	a	342	b
343	d	344	a	345	a	346	c	347	a	348	a
349	c	350	c	351	c	352	b	353	d	354	d
355	c	356	c	357	c	358	d	359	c	360	a
361	d	362	d	363	a	364	d	365	d	366	b
367	d	368	a	369	c	370	d	371	b	372	c
373	b	374	b	375	b	376	a	377	b	378	b
379	c	380	b	381	c	382	d	383	a	384	c
385	d	386	a	387	d	388	c	389	a	390	d
391	b	392	d	393	d	394	c	395	b	396	a
397	c	398	d	399	d	400	c	401	c	402	d
403	c	404	d	405	a	406	c	407	a	408	b
409	b	410	b	411	d	412	a	413	d	414	a
415	d	416	c	417	b	418	c	419	a	420	b
421	b	422	b	423	c	424	a	425	d	426	a
427	a	428	c	429	d	430	c				

*A- High, B- Moderate, C- Low

Chapter 3

Mining Machinery

1. **Rack & Pinion is used for**
   (a) large spend reduction
   (b) to convert rotary motion into a liner motion
   (c) convert vertical motion to vertical motion in a different angle
   (d) to reduce and convert linear motion into a rotary motion

2. **In squirrel cage motor and slip-ring induction motor the ..... is similar.**
   (a) Stator (b) Rotor (c) both stator & rotor (d) None

3. **The squirrel cage motor is used for –**
   (a) motors having starting torque is heavy
   (b) for smaller motors consuming less power
   (c) None

4. **For power factor improvement, in an induction motor, it should be run at –**
   (a) full load (b) less load (c) None

5. **Power factor improvement can be done by –**
   (a) running induction motor at full load (b) by using capacitor bank
   (c) by using synchronous motor (d) All the above

6. **One of the simplest and most widely used measures of vibration severity of machine is**
   (a) machine rpm (b) machine amplitude
   (c) damage in machine foundations (d) rising of machine body temperature

7. **Almost all machine vibration is due to one of these causes**
   (a) looseness & resonance (b) inefficient operator
   (c) overload to the machine (d) lack of shock absorbing component

8. **Misaligned machine component create one of the following**
   (a) power overload (b) bending moment
   (c) machine fatigueness (d) reduced rpm

9. **When a machine vibrates vigorously and excessively at its natural oscillation rate and with an external aid it said to be experiencing**
(a) free swinging (b) resonance
(c) harmonic oscillation rate (d) repetitive forces

10. **Amplitude of vibration in a machine do not relates to one of the following**
(a) the size of the vibratory movement (b) speed of the movement
(c) the force associated with the movement (d) duration of its running

11. **Friction Clutch is used for**
(a) tail rope haulage (b) endless haulage
(c) belt conveyor (d) scraper chain conveyor

12. **The Automatic Contrivance shall be provided in each shaft exceeding a depth of**
(a) 50 m (b) 70 m (c) 90 m (d) 100 m

13. **Where any person is allowed to work or pass while the haulage is in motion, manholes for refuge shall be provided at intervals of not more than**
(a) 6m (b) 10 m (c) 20 m (d) 30 m

14. **Ratio of water and emulsion in hydraulic fluid is**
(a) 99 : 1 (b) 95 : 5 (c) 50 : 50 (d) 25 : 75

15. **We can use of oxyacetylene flame wielding/cutting in 3rd degree gassy mine, with written approval from -**
(a) Agent (b) Manager (c) Owner (d) Director of Mine Safety

16. **Root mean square or rms amplitude is an indication of**
(a) the amount of vibration energy in the machine
(b) vibration speed attained by a machine
(c) resonance in a machine
(d) looseness in a machine

17. **The rate at which a machine component oscillates is called**
(a) speed of machine (b) vibration freqency
(c) rms frequency (d) indicator of machine condition

18. **It is a device necessary to keep a driving motor running while stopping the driven machine.**
(a) converter (b) clutch
(c) coupling (d) gear

19. **A fluid coupling is also known as**
(a) mechanical linker (b) roller coupling
(c) flexible coupling (d) hydraulic coupling

20. **A flexible coupling is used between**
(a) driver and gear (b) driver and driven shaft
(c) driver and fluid coupling (d) driver and clutch

21. **Which of the following device absorbs shock of the vibrations resulting form misalignment ?**
(a) clutch (b) gear (c) flexible coupling (d) motor

22. **Which of the following clutches can only be engaged when the driving and driven shafts are nearly stationary or running at the same speed?**
(a) jaw clutch (b) friction clutch
(c) centrifugal clutch (d) rack and pinion

23. **This attachment is fitted in any UG machinery to eliminate the possibility of sparks and to cool down the temperature of hot gases?**
(a) friction clutch (b) flame trap (c) fluid coupling (d) slag wool

24. **By belt conveyor the maximum size of the lumpy coal/ore is dependent on**
(a) < ½ the width of the belt (b) > ½ the width of the belt
(c) Speed of the belt (d) None of the above

25. **Jigging or reciprocating movement is associated with**
(a) shaker conveyor (b) belt conveyor
(c) diesel locomotive (d) cable belt conveyor

26. **The approximate length of conveyor of loop-take-up portion of a B/Conveyor is A% of the total conveyor length. A is given by,**
(a) 0.5% (b) 1.0 % (c) 2.0% (d) 4.0%

27. **Reciprocating of Jigging movement is known as**
(a) slow forward & quick backward stroke
(b) quick forward & slow backward stroke
(c) both of the above
(d) none of the above

28. **Friction wheels with differential gear is used with**
(a) belt conveyor (b) cable belt conveyor
(c) shaker conveyor (d) high angle conveyor

29. **Calculate the capacity of Belt Conveyor in ton/hour for the following specification :**
i) Bulk density of material = 0.8 t/m³ ii) Material cord length = 1.2 m
iii) Belt deflection angle = 120 m/min iv) Angle of repose = 20°
(a) 27 (b) 32 (c) 37 (d) 42

30. **The ratio of the actual load carried by the conveyor during its running period to the nominal capacity for these hours is known as**
(a) average loading factor (b) cable belt conveyor
(c) chain conveyor (d) shaker conveyor

31. **Sandwich conveyor is a type of**
(a) high angle conveyor (b) cable belt conveyor
(c) chain conveyor (d) shaker conveyor

32. **Name the machine that is used to give a suitable curvature to a piece of rail?**
(a) backstay (b) puller (c) jim crow (d) axle

33. **What is the track gauge for tubs of 1.1m³?**
(a) 0.4 m (b) 0.6 m (c) 0.8 m (d) 1 m

34. **Which of the following factor is not a criterion to be considered for calculating the amount of super-elevation?**
(a) radius of curve (b) speed of train
(c) size of tub (d) track gauge

35. **What piece of rail given at the point of crossing is known as**
(a) jazz rail (b) check rail (c) mono (d) granby rail

36. **Which of the following clutch is preferably used with direct rope haulage?**
(a) dog clutch (b) friction clutch
(c) centrifugal clutch (d) all of the above

37. **Name the device that protects electric winding engines from excessive speed, over winding and rapid acceleration.**
(a) depth indicator (b) lilly controller
(c) slow banker (d) solenoid thrustor

38. **Name the method of speed control of large winders usually of above 800 kW?**
(a) OCB filter (b) ACB filter
(c) Ward Leonard method (d) rheostatic control method

39. **As per mining regulations, for every shaft exceeding 100m depth and durin hoisting of men the speed should not exceed**
(a) 0.5 m/s (b) 1 m/s (c) 1.5 m/s (d) 5 m/s

40. **When do you recommend some form of electric braking in addition to th mechanical braking for electrical winders?**
(a) for high diameter shaft (b) to safe guard electric installation
(c) for deeper shafts (d) for economy in working

41. **The alternative name of Koepe winder is**
(a) drum winder (b) friction winder
(c) multi-rope winder (d) bi-cylindro winder

42. **In koepe winders, the power is transmitted through the friction between**
(a) winding rope and lining of sheave (b) winding rope and tail rope
(c) tail rope and skip (d) drum and koepe winders

43. **In a Winder, having winding drum diameter 4.2 m; and maximum rope spee is 8m/s. Calculate the power of the motor, if the r.m.s. torque for a winder i 120 kNm,**
(a) 257 kW (b) 307 kW
(c) 357 kW (d) 457 kW

44. **For hoisting in deep mines, this drum is employed as it reduces the net startin torque?**
(a) cylindro conical (b) by-cylindro conical
(c) cylindrical (d) None

45. **For drum winders to with Koepe winding, for winding the factor of safet required is**
(a) 1 (b) 3 (c) 5 (d) 7

46. **For drum winders to be used for men winding factor of safety required is**
(a) 4 (b) 6 (c) 8 (d) 10

47. **Where keps are located?**
(a) at pit bottom (b) at pit top
(c) at mid set landing (d) at top of the cage

48. **To overcome the decking difficulties, in Koepe winder, this is provided -**
(a) keps (b) hinged platform
(c) rope guide (d) flexible guide

49. **In which winders, the detaching hooks are used -**
(a) drum winders (b) koepe winders
(c) both drum and koepe winders (d) none of the above

50. **Detaching hook is a safety device which acts when**
(a) the cage is at bottom (b) the cage is pit top
(c) over wind takes place (d) the cage is at mid-landing position

51. **The angle between the vertical plane of the pulley and the rope when the cage is at the pit top or pit bottom is known as**
(a) angle of draw (b) angle of fleet
(c) angle of collimination (d) angle of repose

52. **Why the fleet angle is limited to 1.5 ^{0} ?**
(a) To reduce wear and tear of the Winding Rope
(b) To reduce side travel on the Pulley
(c) To allow maximum persons to travel
(d) Allowing the use of lesser dia. Winding Rope

53. **When angle of fleet exceeds 1.5°, what will happen -**
(a) vibration to headgear structure (b) shock to cage
(c) wear and tear on pulley (d) wear of rope and pulley

54. **Rotation of impeller inside the pump forces water to enter in the suction pipe. This is effected due to**
(a) reduction (b) suction (c) revolution (d) none of the above

55. **In the volute casing of a pump the velocity of air gradually decreases but pressure energy increases correspondingly. This happen in accordance with**
(a) Bernoulli's theorem (b) Pithagorus theorem
(c) Graham's theorem (d) Hook's law

56. **Which of the following has little or no effect on the development of head in a pump?**
(a) design of diffuser (b) curvature of impeller
(c) delivery pipe range (d) speed of impeller

57. **Turbine or Centrifugal pump works at its best efficiency while dealing with**
(a) exact head (b) reduced head
(c) simple volute casing (d) diffusion channel

58. **Capacity to continue pumping operation even if air enters into the water pipelines is known as**
(a) core (b) snore (c) driver (d) carrier

59. **A turbine pump is delivering less than specified quantity of water, because of–**
(a) Worn out impellers (b) Pump has become old
(c) Leakages (d) All the above

60. **Which of the following problem will be encountered if head of the pump is much reduced?**
(a) quantity of water will decrease sharply (b) overload the motor
(c) volute casing will be broken (d) balancing disc will be worn out

61. **Starting by a centrifugal of turbine pump must require**
(a) priming (b) opening of value
(c) reciprocating (d) snoring

62. **The term 'Head' in a pump refers to -**
(a) distance between pump motor and discharge point
(b) vertical distance between suction end to discharge point
(c) distance between suction end to pump impeller
(d) pump impeller to discharge point

63. **The impeller of pump rotates rapidly within**
(a) motor of pump (b) suction pipe range
(c) delivery pipe range (d) volute casing

64. **Volute casing in a pump**
(a) has gradual increasing cross-section
(b) has gradual decreasing cross-section
(c) has uniform cross-section
(d) has randomly increasing cross-section

65. **For the development of 'head' which factor has little or no effect -**
(a) diameter and speed of impeller
(b) curvature of impeller
(c) design of diffuser
(d) distance between pump motor and delivery point

66. **The relationship between water quantity (Q) and rotation if impeller (rpm), referred to : Laws governing a pump, is**
(a) Q = rpm (b) Q > rpm (c) Q " rpm (d) Q " 1/rpm

67. **We encounter the following difficulties when the head reduces in a turbine or centrifugal pump -**
(a) pump will lift reduced water
(b) quantity of water delivered will increase and will overload the motor
(c) motor capacity will reduce
(d) impeller will not properly function

68. **While shaft sinking, pumps are used for dewatering. Name the type of pump used –**
(a) face pump (b) submersible pump
(c) turbine pump (d) vertical drill pump

69. **By sprinkling water from the excavator over the blasted material before engaging the excavator improves in –**
(a) better digging (b) dust control
(c) less wear & tear of the teeth (d) None

70. **Rock breaker attachment is attached to –**
(a) Surface miner (b) Rope shovel (c) Hydraulic excavator (d) None

71. **This method relates to excavation by Continuous surface miner–**
(a) Wind rowing (b) high wall miner (c) rock breaking (d) None

72. **This machinery is not part of 'blast free mining' system in opencast mines –**
(a) Continuous surface miner (b) Continuous miner
(b) Highwall miner (d) Rock breaker

73. **Continuous surface miners are being adopted in coal mines where the compressive strength is up to –**
(a) 80 MPa (b) 60 MPa (c) 50 MPa (d) None

74. **This pump is used as main pump at the pit bottom sump-**
a) face pump (b) submersible pump
(c) multi-stage turbine pump (d) vertical drill pump

75. **In a centrifugal pump this is not provided -**
(a) impeller (b) volute casing
(c) balancing disc (d) foot value

76. **For how many years winding rope has to be used :**
(a) Two and half years (b) Three years
(c) Three and half years (d) Four years

77. **In direct rope haulage the track gauge width is**
(a) 0.6m (b) 0.8m (c) 1.1m (d) 1.0m

78. **Joining of Ropes is termed as**
(a) Rope splicing (b)Rope stitching
(c) Rope stretching (d) Rope vulcanizing

79. **'Lay' term is used in wire ropes to denote –**
a) Weight of the wire rope (b) Direction of laying of wire rope
c) Space factor of rope (d) Direction of movement of rope.

80. **No special fittings or attachments is attached, in this method of rope jointing**
(a) rope splicing (b) laying of wires
(c) vulcanizing (d) pre-stressing

81. **On observing this tendency of a rope, it is replaced -**
(a) outer wires becomes loose and kinked
(b) outer wires have lost almost 1/3rd of its diameter
(c) waviness is observed but rope remains intact
(d) FOS becomes low

82. **Rope becomes fatigue due to repeated application of stress. This is known as -**
(a) obscure physical changes
(b) attrition and loosening of material from rope surface
(c) elastic changes
(d) visual abrasive changes

83. **IWRC ropes have more load bearing capacity, and are preferred over flat ropes. Why ? rope?**
(a) is has independent wire rope in the core making is stronger
(b) lubrication can be done from outside making it suitable for operating high load
(c) outer wires are more strong and stable than flat rope
(d) kinks cannot take place on these ropes

84. **Method of joining two wire ropes permanently without using special fittings or attachments is known as**
(a) rope splicing (b) laying of wires
(c) vulcanizing (d) pre-stressing

85. **Which of the following criteria w.r.t rope is not considered for its removal from service?**
(a) outer wires becomes loose and kinked
(b) outer wires have lost almost 1/3rd of its diameter
(c) waviness is observed but rope remains intact
(d) None of the above

86. **Due to repeated application of stress rope becomes fatigued which can be explained as**
(a) obscure physical changes
(b) attrition and loosening of material from rope surface
(c) elastic changes
(d) visual abrasive changes

87. **It has been found that the IWRC rope has more load bearing capacity than flat rope, why?**
(a) is has independent wire rope in the core making is stronger
(b) lubrication can be done from outside making it suitable for operating high load
(c) outer wires are more strong and stable than flat rope
(d) kinks cannot take place on these ropes

88. **Tail rope haulage is mainly used as**
(a) main rope haulage (b) haulage for waste disposal
(c) as a buffer haulage inside the district (d) to replace endless haulage

89. **Main advantage of using main and tail rope haulage is**
(a) no derailment of tub occur (b) suitable for high output
(c) suitable for undulating roadways and one operator can drive both drums
(d) long train or tubs can be attached

90. **Squirrel cage motor is mainly used with**
(a) endless haulage (b) tail rope haulage
(c) belt conveyor (d) shaker conveyor

91. **Which of the following accessories is used with the over rope type haulage?**
(a) dog catch (b) smallman clip
(c) lashing chain (d) khit

92. **Which of the following safety devices is incorporated with the surface tippler?**
(a) automatic catch (b) back catch
(c) screw clip (d) pull chord

93. **Which of the following haulages is preferred for undulating roadways?**
(a) direct rope haulage (b) endless haulage
(c) main & tail rope haulage (d) tail rope haulage

94. **Which of the following haulage is used as main rope haulage?**
(a) endless haulage (b) direct rope haulage
(c) tugger haulage (d) tail rope haulage

95. **Which of the following haulage is situated at a lower level and empties are hoisted up the sloping track?**
(a) endless haulage (b) direct rope haulage
(c) tail rope haulage (d) main and tail rope haulage

96. **A direct rope haulage pulls 8 tubs loaded with coal through an incline of length 500m having an inclination of 1 in 6. Consider the following additional data :**
Capacity of tub – 1.0 tonne Tare weight of tub – 500 kg
Hauling speed – 9 km per hour Coefficient of friction between wheel & rail – 1/60
Coefficient of friction between rope & drum – 1/10
Mass of rope per meter – 1.5 kg.
The minimum power required to haul the tubs in kW is-
(a) 3456.50 (b) 348.60 (c) 350.10 (d) 365.50

97. **Operation of which of the following haulage is just opposite to that of direct rope haulage?**
(a) tugger haulage (b) gravity haulage
(c) tail rope haulage (d) main and tail rope haulage

98. **Which of the following haulage require two parallel tracks side by side?**
(a) tugger haulage (b) direct rope haulage
(c) tail rope haulage (d) endless haulage

99. **In which of the following haulage, any derailment shall cause for a heavy damage?**
(a) endless haulage (b) tail rope haulage
(c) main and tail rope haulage (d) direct rope houlage

100. **Jaw clutch is provided with**
(a) tail rope haulage (b) direct rope haulage
(c) endless haulage (d) gravity haulage

101. **The direct rope haulage system can also serve branch roads if the gradient is**

suitable and the road deviating at an angle of not more t
(a) 10° (b) 20° (c) 30° (d) 40°

102. In the mining ropes used 'Lay' indicates -
(a) lay indicates the direction of laying of strands in the rope
(b) lay indicates the direction of laying of wires in the strand
(c) lay indicates the type of rope
(d) lay indicates the heaviness of rope

103. Which of the following centre core looks like an independent wire rope?
(a) SSC (b) fiber core (c) IWRC (d) vetetable core

104. This rope type has very smooth exterior surface -
(a) round stranded (b) flattened stranded
(c) full lock (d) half lock

105. The initial stretch in a wire rope, is removed or eliminated by this process -
(a) pre-forming (b) pre-stressing
(c) galvanzing (d) tempering

106. In this process the wires and the strands are given the appropriate spiral shape by drawing the wires through a die-
(a) Galvanizing (b) vulcanizing
(c) pre-forming (d) pre-stressing

107. Removal of metals from outer wires in a rope was observed. What type of wear it is ?
(a) plastic wear (b) abrasive wear
(c) differential wear (d) temporary wear

108. By this method we can reduce corrosion in wire rope -
(a) applying proper load on it
(b) operating it in an acid free site
(c) proper lubrication with good quality lubricants
(d) restricting dis-integration of fibres

109. Any obscure physical change in the rope due to repeated application of stress is
(a) wear (b) corrosion
(c) fatigue (d) deformation

110. In this system the right hand ordinary lay wire rope is useful -
(a) winding (b) haulage

(c) crane (d) bucket supporting rope

111. In this Rope type, strands are stitched side by side -
(a) round stranded rope (b) flat rope
(c) flattened rope (d) looked coil rope

112. In belt conveyor comprises of various layers, these are known as -
(a) woven fabric (b) carcass
(c) pvc fabric (d) nylon fabric

113. To make the conveyor belt fire resistant, this coating is applied -
(a) pvc (b) nylon
(c) rubber (d) bentonite

114. Trough shape of the belt conveyor is made with the help of
(a) bottom roller (b) idler set
(c) drive roller (d) snub pulley

115. Pipe conveyors are –
(a) environment friendly (b) energy efficient
(c) easy to maintain (d) all the above

116. Belt conveyor capacity depends on -
(a) belt speed (b) trough angle
(c) belt width (d) all the above

117. The ratio of load carried by the conveyor during its normal running period with respect to to the capacity at its nominal speed is called
(a) belt factor (b) average loading factor
(c) swelling factor (d) power factor

118. In a scraper chain conveyor, a series of iron container moves on this, is known as
(a) driving wheel (b) donga or pan
(c) sprocket (d) drum

119. Rack & Pinion is used for
(a) large spend reduction
(b) to convert rotary motion into a liner motion
(c) convert vertical motion to vertical motion in a different angle
(d) to reduce and convert linear motion into a rotary motion

120. **The coefficient of static friction between wheels & rail for locomotive is usually**
(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

121. **Flame trap of flame arresfor is used with**
(a) conveyor (b) direct haulage
(c) diesel locomotive (d) shaker conveyor

122. **Exhaust conditioner is used with**
(a) diesel locomotive (b) battery locomotive
(c) overhead locomotive (d) compressed locomotive

123. **The exhaust of Diesel loco is mixed with fresh air before being discharged into open atmosphere of mine. The minimum quantity of fresh air mixed with the exhaust is A times of volume of exhaust 'A' is given by**
(a) 5 (b) 10 (c) 20 (d) 40

124. **The flame trap of diesel locomotive is liable to choke up due to**
(a) dust in air (b) impure engine oil
(c) narrow aperture of plates (d) poor filter

125. **Which of the following can be used safely right upto the face of coal mine?**
(a) battery loco (b) diesel loco
(c) trolley wire loco (d) all of these

126. **Charging of battery of battery loco gives off**
(a) H_2 (b) CH_4 (c) H_2S (d) NO_2

127. **Which of the following reason restrict the use of loco in underground coal mine?**
(a) cost (b) ventilation (c) safety (d) output

128. **Slip ring motor with controller is used with**
(a) direct rope haulage (b) belt conveyor
(c) jigging plant (d) tail rope haulage

129. **An attachment used with the last tub of the set of ascending tubs, is known as**
(a) automatic catch (b) backstay
(c) buffer (d) stopblock

130. **On a curve, which of the following force creates tendency for the train to leave the truck causing excessive wear on the wheels?**

(a) centripetal force (b) centrifugal force
(c) frictional force (d) gravitational force

131. **135 ton of coal is to be hauled by direct rope haulage in a shift of 6 hours hauling time where the length of haul is 1100m. The average speed of rope is 6 Km/Hr. Set changing time is 1 min & tub capacity is 1.5 ton. Calculate the number of tubs per set?**
(a) 6 (b) 9 (c) 12 (d) 15

132. **If the track guage of underground haulage is 0.6 m, radius of curve 2 m, velocities of train 2 m/sec, then find out the amount of super elevation.**
(a) 0.02 (b) 0.12 (c) 0.22 (d) 0.32

133. **This type of locomotive does not carry the source of power with it, during its operating time ?**
(a) battery loco (b) diesel loco
(c) trolley wire loco (d) compressed air loco

134. **Tractive effort or tractive force depends on**
(a) rail track size (b) power of loco
(c) weight of loco (d) number of mine cars

135. **While calculating the tractive force of a loco whose weight is known, this is essential -**
(a) power feed system
(b) frictional adhesion between locomotive wheels and rail track
(c) draw bar
(d) number of cars attached with it

136. **This locomotive type, liberates exhaust gases -**
(a) battery loco (b) diesel loco
(c) trolley wire loco (d) battery loco

137. **Exhaust conditioner is provided in this locomotive -**
(a) trolley wire loco (b) compressed air loco
(c) diesel loco (d) battery loco

138. **Where the coal is liable to spontaneous heating, this type of loco is not recommended?**
(a) battery loco (b) diesel loco
(c) trolley wire loco (d) compressed air loco

139. **Which of the following locomotive is suitable for long haul and require sufficiently high width of roadway?**

(a) compressed air loco (b) diesel loco
(c) trolley wire loco (d) battery loco

140. In overhead wire loco the electricity is collected by
(a) arm (b) pantograph
(c) extended wires (d) power pack

141. Mine cars having low tare-load ratio, have the following advantage -
(a) increases the number of trips of locomotives
(b) increases the length of trains of cars
(c) increases the capacity of cars i.e. trains
(d) it increases the total energy required for the purpose of hauling

142. While selecting a mine car, this condition is not important -
(a) tare-load ratio (b) stability of car
(c) length of haul (d) co-efficient of space utilization

143. It is the ratio of the car capacity, and maximum length, width and height of the material to be transported/hauled -
(a) co-efficient of utilization of space (b) co-efficient of resistance
(c) stability of car (d) tone of load carried by the car

144. Use of this material do not increase the stability of a mine car -
(a) limiting the ratio of the length of the body to the wheel axle base to 3:1
(b) proper super-elevation of outer rail on curve
(c) lowering the centre of gravity of cars
(d) using strong alloys of huge weight in its construction

145. It is the ratio between resistance to the motion of a car along a straight level track with constant speed to the total weight of car
(a) co-efficient of utilization of space (b) co-efficient of resistance
(c) co-efficient of carrying capacity (d) co-efficient of tractive effort

146. 'Drop war wick' is used in underground haulage track for –
(a) Providing safety (b) As a coal lifting device
(c) As a tub coupling (d) Super elevation of the track

147. To restrict the over speeding of the coal tubs, this is used :
(a) Mono rail (b) Jazz rail (c) Driving wheel (d) None of the above

148. Which appliance is used in a track line to give suitable curvature?
(a) Backstay (b) Jim crow (c) Drop war wick (d) Small man clips

149. Run away switch – is fitted with

(a) Direct rope haulage (b) Endless haulage
(c) Gravity haulage (d) None of the above

150. Why jazz rails are used in underground haulage track?
(a) to provide smooth running of tube (b) to avoid derailment of tubs
(c) to avoid over speeding (d) to maintain good alignment of track

151. For installing drop-war-wick, which of the following seems to be the better location ?
(a) at mine entrance (b) at district entrance
(c) at places where inclination is very high (d) just above main dip

152. A ratio indicates the relation between mine car capacity and its weight is known as
(a) car stability (b) car utilization ratio
(c) tare-load ratio (d) space utilization ratio

153. Which of the following in relation to mine car is true?
(a) a low tare-load ratio increases the capacity of a train of cars
(b) a low tare-load ratio increases the number of trips of locomotives
(c) a low tare-load ratio increases the energy losses
(d) a low tare-load ratio has increased length of siding in underground as well as in the surface

154. The ratio of car capacity to the product of the maximum length, width and height in called
(a) co-efficient of utilization of space (b) co-efficient of resistance
(c) co-efficient of stability of car (d) co-efficient of loading in a car

155. The average value of co-efficient of utilization of space of a mine car in Indian underground mining context varies from
(a) 0.2 to 0.3 (b) 0.4 to 0.5 (c) 0.5 to 0.6 (d) 0.7 to 0.9

156. Which of the following force is not acted on a mine car which it is in motion?
(a) gravitational (b) torsion (c) tractive (d) centrifugal

157. In order to increase the stability of a mine car the limiting ratio of the length of the body to its wheel axle base generally remains as
(a) 1 : 1 (b) 2 : 1 (c) 3 : 1 (d) 5 : 1

158. It is the ratio between the interruption to the motion of a car along a straight level track with constant speed to the total weight of car
(a) co-efficient of utilization of space
(b) co-efficient of resistance

(c) co-efficient of adhesion
(d) co-efficient of car stability

159. Which of following is not a selecting criterion of choice of type and size of car in a mine?
(a) mode of loading and unloading into cars
(b) haulage road cross-section
(c) type and quantity of support items to be transported
(d) system of transport adopted

160. Coal Cutting Machine(CCM) is powered by
(a) Diesel (b) Electricity
(c) Both Diesel & Electricity (d) None of the above

161. CCM cut face gives better
(a) Powder factor (b) Uniform fragmentation
(c) Generates oversize coal (d) None of the above

162. Side Discharge Loader (SDL) is a
(a) crawler mounted machine (b) tyre mounted machine
(c) both a & b (d) rail mounted machine

163. Coal cutting machine is used
(a) to cut and load coal at the face
(b) to create free face
(c) to avoid using explosive
(d) to drive gallery and load coal onto stage loader

164. Now-a-days use of CCM has become obsolete due to
(a) introduction of continuous miner
(b) introduction of DERDS
(c) introduction of coal plough
(d) introduction of delay action detonators

165. Which type of cable is required for the operation of SDL?
(a) proper insulated lead sheathed double armoured wire
(b) concentric
(c) 5-core flexible cable
(d) 3-core non-flexible cable

166. What type of hydraulic fluid is required for LHD?
(a) servo-68 (b) HF8-68 (c) servo-460 (d) HP-90

167. What is the maximum suitable hauling distance for SDL to give best performance?

(a) upto 25 m of haul length (b) upto 50 m of haul length
(c) upto 75 m of haul length (d) upto 100 m of haul length

168. Which of the indigenous firm do manufacture SDL & LHD in India?
(a) HEC Ltd (b) Atlas Copco
(c) Eimco Elecon (d) Tractors India limited

169. What type of safety features are attached with LHD machine?
(a) audio-visual alarm while reversing (b) front and rear light
(c) dynamic and parking brake (d) all of the above

170. What type of ventilation is recommended for SDL/LHD?
(a) 1 m^3 / minute/Kw of motor power
(b) 5 m^3 / minute/Kw of motor power
(c) 10 m^3 / minute/Kw of motor power
(d) 15 m^3 / minute/Kw of motor power

171. Road header is used to drive
(a) single heading (b) double heading
(c) triple heading (d) more than three heading

172. Expected output from a continuous miner in underground
(a) 100 tpd (b) 500 tpd (c) 1000 tpd (d) 1500 tpd

173. Which of the following type of support is to be used for the gallery run by LHD?
(a) timber props (b) wooden cogs
(c) hydraulic props (d) full grouted roof bolting

174. What is the maximum permissible gradient for LHD?
(a) 1 in 1 (b) 1 in 2 (c) 1 in 6 (d) 1 in 12

175. For belt conveyors, in which manner the sequence control operation is useful?
(a) interruptions in conveying gets reduced
(b) if an out bye conveyor stops then other conveyor will also stop diminishing chances of coal heap at tail end.
(c) it improves the life of conveyor thereby reducing the running cost
(d) it acts as shock absorbing operation

176. In shaker conveyor which of the following action in observed?
(a) frictional motion (b) cradle movement
(c) jigging movement (d) quick forward and slow backward movement

177. Cable Belt Conveyor has been in operation at the Bauxite Mine of NALCO. For this conveyor, which of the following gear is suitable?

(a) differential gear (b) rack and pinion gear
(c) bevel gear (d) helical gear

178. **In a belt conveyor, how do you achieve "trough shape"?**
(a) woven fabric (b) steel cable layering
(c) idler set (d) loop-take-up

179. **A conveyor is 600m long carrying coal having bulk density 0.8 t/m³ up a gradient of 1 in 60 at the rate of 220 t/hr. If the belt width (w) is 0.75m and cross-sectional area of the material is 0.1w², determine belt speed?**
(a) 1.26 m/s (b) 1.36 m/s (c) 1.86 m/s (d) 2.26 m/s

180. **Which of the following serves as fire-resistant material in belt conveyor?**
(a) polymeric compound (b) neoprene
(c) ammonia (d) brine solution

181. **When conveyor is snapped during its use, to join it some portion of the belt is cut from both end. This is taken from the extra 1 – 1.5% of belt conveyor, section provided within the conveyor itself. Where this extra meterage/length is provided?**
(a) driving arrangement (b) steel channel runner
(c) tail end (d) loop-take up

182. **Average loading factor (ALF) of belt conveyor is belt conveyor is dependent on which of the following parameter?**
(a) volume of mineral at face (b) belt speed
(c) location of conveyor (d) belt inclination

183. **Which of the following has little or no bearing on the carrying capacity (tph) of belt conveyor?**
(a) belt speed (b) size of mineral (c) trough angle (d) belt width

184. **The automatic contrivance shall prevent the descending cage from being landed at pit bottom at a speed exceeding**
(a) 1.5 m/s (b) 3 m/s (c) 4.5 m/s (d) 6 m/s

185. **In connection with man winding, the approximate floor area per person in a cage shall be**
(a) 0.1 m². (b) 0.2 m². (c) 0.3 m² (d) 0.5 m²

186. **What is the minimum gradient where every tub shall be held effectively by brakes or securely coupled to a haulage rope?**
(a) 1 in 5 (b) 1 in 10 (c) 1 in 20 (d) 1 in 40

187. **Every man-hole shall be kept clean & clear of obstruction, white-washed for a distance of not less than**
(a) 0.3 m (b) 0.6 m (c) 0.9 m (d) 1.2 m

188. **The attachment called 'Backstay' is used with**
(a) underground haulage (b) locomotive
(c) belt conveyor (d) scraper chain conveyor

189. **Which metal is used for the purpose of Capping of Winding ropes?**
(a) Cu (b) Zn (c) Fe (d) Ag

190. **No mode or type of Capping shall be used which fails to withstand a load o at least 'N' times the maximum static load. N is given by**
(a) 4 (b) 6 (c) 8 (d) 10

191. **In connection with lowering or raising of persons by means of bucket etc. for a shaft exceeding 'A' m in depth, there shall be significant cover overhead for protection from things falling down the shaft. A is given by**
(a) 130 m (b) 190 m (c) 270 m (d) 500 m

192. **Why jazz rails are used in haulage track ?**
(a) to provide smooth running of tube (b) to avoid derailment of tubs
(c) to avoid over speeding (d) to maintain good alignment of track

193. **Where drop-war-wick can be best located -**
(a) at mine entrance (b) at district entrance
(c) at places where inclination is very high (d) just above main dip

194. **The automatic contrivance shall prevent the descending cage from being landed at pit bottom at a speed exceeding**
(a) 1.5 m/s (b) 3 m/s (c) 4.5 m/s (d) 6 m/s

195. **In connection with man winding, the approximate floor area per person in a cage shall be**
(a) 0.1 m². (b) 0.2 m². (c) 0.3 m² (d) 0.5 m²

196. **What is the minimum gradient where every tub shall be held effectively by brakes or securely coupled to a haulage rope?**
(a) 1 in 5 (b) 1 in 10 (c) 1 in 20 (d) 1 in 40

197. **Every man-hole shall be kept clean & clear of obstruction, white-washed for a distance of not less than**
(a) 0.3 m (b) 0.6 m (c) 0.9 m (d) 1.2 m

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201. In connection with lowering or raising of persons by means of bucket etc. for a shaft exceeding 'A' m in depth, there shall be significant cover overhead for protection from things falling down the shaft. A is given by
(a) 130 m (b) 190 m (c) 270 m (d) 500 m

202. In endless scraper chain conveyor after every 3 to 4 links there is one very important idem is provided. What is that item?
(a) flight (b) shear pin (c) sprocket (d) trough

203. Which of the following has low FOS and not suitable for shock load or too heavy load?
(a) SSC (b) IWRC (c) fibre core (d) central core

204. There are two main types of Continuous Miner cutter head, Name them -
(a) chopper (b) ripper & borer (c) spur head (d) None

205. Which types of cables are used in portable & transportable apparatus?
(a) armoured cable (b) flexible cable
(c) pilot cable (d) bi-cable

206. A centrifugal pump has a discharge rate of 2000L of water per min against a total head of 200m. If the pump efficiency is 75%, the input power to the pump in kW is –
(a) 87.20 (b) 49.05 (c) 13.33 (d) 7.50

207. A dragline is required to remove 3,00,000 m3 of rock per month on the bank volume basis. consider the following date for the dragline operation.
Effective working hours per month = 450
Bucket fill factor = 0.8
Cycle time = 65s
Swell factor of the rock = 1.25

The minimum bucket capacity of the dragline in m3 is
(a) 7.70 (b) 9.63 (c) 12.04 (d) 18.80

208. Recapping & winding rope is done to
(a) increase the flexural strength of the rope
(b) increase the flexibility of the rope
(c) remove & portion of the rope subjected to deterioration
(d) prevent the rope from excessive rusting

209. Match the following for standard diamond drill rods.
(a) P-r; Q-q; R-s; S-p (b) P-r; Q-p; R-s; S-q
(c) P-q; Q-r; R-p; S-s (d) P-q; Q-r; R-s; S-p

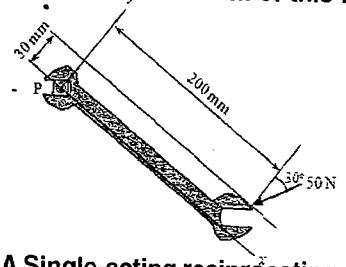
210. Given the following,

Equation/formula/law	Application
P. Bernoulli equation	1. Pressure loss in laminar flow of fluid
Q. Poiseuille equation	2. Drag loss due to regular obstructions in fluid flow
R. Bromilow's formula	3. Energy conservation in ideal fluid flow
S. Stokes law	4. Terminal settling velocity of fine particles in fluid

the correct match is
(a) P-3, Q-1, R-2, S-4 (b) P-1, Q-3, R-2, S-4
(c) P-2, Q-3, R-4, S-1 (d) P-3, Q-1, R-4, S-2

211. In a drum hoisting system through a vertical shaft, over winding is prevented by
(a) Lilly Controller (b) Detaching hook (c) Caliper brake (d) Safety catch

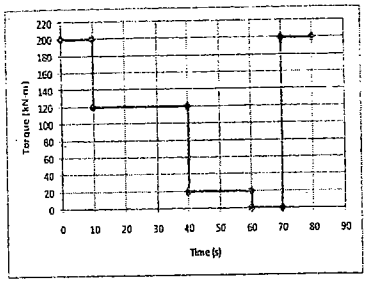
212. A force of 50 N is applied to a wrench as shown in figure. The magnitude of the moment in N-mm of this force about the point P is .....



Ans. 7900 to 7920

213. A Single-acting reciprocating pump delivers 0.018 m³/s of water when running at 45 cycles per minute. The piston diameter is 300mm and stroke length is 400mm. The volumetric efficiency of the pump in % is .....
Ans. 83 to 87

214. The 3-period torque-time diagram of a statically balanced hoist is shown in the figure.The rms torque for the motor in kN-m is .....



Ans. 106 to 113

215. A loaded dumper of total mass 75 tonne, having wheel diameter 1250mm runs on a haul road which offers an average specific rolling resistance of 260 N/tonne. The engine develops an axle torque of 15 kN-m. The starting acceleration of the dumper in m/s² is .....

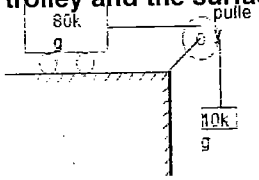
Answer : 0.055 to 0.065

216. Match the following in the context of Indian mining practice -

Equipment	Power source
P. Rocker shovel	1. Battery
Q. Locomotive	2. Compressed Air
R. Shearer	3. Electricity(maximum voltage 6.6kV AC)
S. Dragline (24/96)	4. Electricity (maximum voltage 1.1kVAC)

(a) P-1, Q-2, R-3, S-4 (b) P-2, Q-1, R-4, S-3
(c) P-2, Q-1, R-3, S-4 (d) P-1, Q-3, R-2, S-4
Ans: (b)

217. In the following figure, the coefficient of kinetic friction between the trolley and the surface is 0.04.



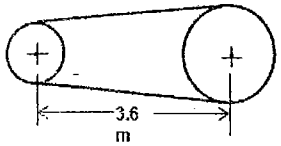
When the block is released from rest, the acceleration of the trolley in m/s² becomes
(a) 9.65 b) 1.23 (c) 1.09 (d) 0.74

218. Two meshing spur gear wheels of Module 6 have 24 and 42 teeth. The distance in mm between the centres of the gear wheels is
(a) 1000 (b) 198 (c) 126 (d) 72

219. Under standard temperature and pressure conditions the theoretical maximum height in m to which water can be lifted using an air-lift pump is
(a) 10.33 (b) 9.61 (c) 7.45 (d) 6.05

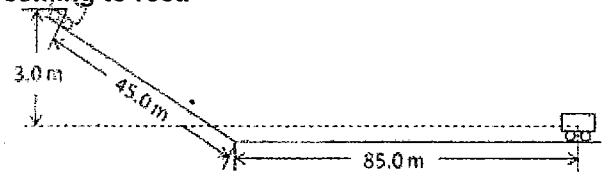
220. In a belt conveyor system, function of the snub pulley is to
(a) clean the inner surface of the belt
(b) clean the outer surface of the belt
(c) increase the angle of contact of belt with drive drum
(d) decrease the belt tension

221. An open belt drive connects two pulleys on parallel shafts that are 3.6 m apart as shown in the figure. The diameters of the pulleys are 2.4 m and 1.6 m. The angle of contact on the smaller pulley in degrees is ___



(a) 123 to 126 (b) 166 to 169 (c) 276 to 279 (d) 534 to 537

222. A two tonne mine car is released from the top of an incline at a height of 3 m as shown in the figure. The mine car travels 45 m along the inclined track and another 85 m along the horizontal track before coming to rest.



The specific rolling resistance of the car in N/tonne is 225 to 231

223. A surface miner with 2.0 m cutting drum width excavates coal in windrowing mode from a bench with effective face length 200 m. The cutting speed of the surface miner is 10 m/min and the cutting depth 25 cm. The density of coal is 1.4 tonne/m³. If the average turning time of the machine at the face end is 5 min, the rate of production in tonne/hour becomes
335 to 337

224. A bucket wheel excavator with 20 buckets of capacity 0.5 m³ each, rotates at 5 rev/min. The bucket fill factor is 80%. The excavator loads on to 1200 mm wide belt conveyor. The cross-section area (m²) of the material on the belt is $0.1B^2$, where B is the belt width in m. The minimum speed of the belt in m/s to avoid spillage of material is
(a) 7.23 (b) 5.79 (c) 4.63 (d) 3.70

225. Given the following,

Machine	Component
P. Dint header	1. Cowl—
Q. Coal Plough	2. Cutting chain
R. Road header	3. Loading apron
S. Shearer	4. Static set of bits

The correct match is

(a) P-4,Q-2,R-3,S-1 (b) P-3,Q-4,R-2,S-1

(c) P-2,Q-3,R-4,S-1 (d) P-2,Q-4,R-3,S-1

226. Given the following,

Excavating/Loading Machine	Trasportation scheme
P.BWE(Bucket wheel excavator)	1. Mine tub
Q. Continuous Miner	2. Armoured flexible chain conveyor
R.Shearer	3.Shiftable Conveyor
S.LHD (Load Haul Dump)	4.Shuttle car

the correct match is

(a) P-3, Q-2, R-4, S-1 (b) P-3, Q-4, R-2, S-1

(c) P-3, Q-2, R-1, S-4 (d) P-1, Q-4, R-3, S-2

227. The time study data of an equipment deployed in a mine during a calendar month is given below.

Total working hours = 400

Total maintenance hours = 100

Total hours of actual work = 240

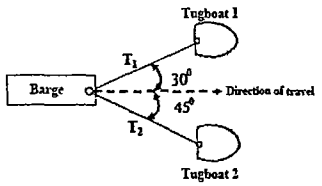
The percentage of utilization of the equipment is

(a) 85 (b) 80 (c) 65 (d) 60

228. A 1 tonne mine car traveling at a constant speed of 10 km/h collides with a stationary buffer and comes to rest. If the buffer spring stiffness is 200 kN/m, the maximum compression in the spring in mm is

(a) 49 (b) 38 (c) 196 (d) 247

229. In an iron ore handling port, a barge is pulled by ropes using two tugboats as shown in the figure. In equilibrium, the resultant of the force T1 and T2 along the axis of the barge in the direction of its travel is 5000 N. The tensions T1 and T2 in N are



(a) 9700 and 6831 (b) 6831 and 9700

(c) 3660 and 2588 (d) 2588 and 3660

230. Match the following

Hydraulic system components	Symbols
P Fixed displacement unidirectional flow pump	1
Q Fixed displacement unidirectional flow motor	2
R Accumulator	3
S Filter	4

(a) P-4, Q-2, R-3, S-1 (b) P-2, Q-4, R-3, S-1

(c) P-3, Q-2, R-1, S-4 (d) P-2, Q-3, R-1, S-4

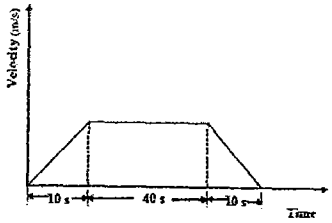
231. Match the following

Mine car type	Mode of unloading
P. Granby	1. Bottom opening
Q. Gable bottom	2. Both side tilting
R. Drop bottom	3. Single side opening
S. Rocker dump	4. Both side opening

(a) P-2, Q-4, R-3, S-1 (b) P-4, Q-1, R-3, S-2

(c) P-3, Q-1, R-4, S-2 (d) P-3, Q-4, R-1, S-2

232. A mine winder cage traveling 450 m from pit bottom to pit top is following a three period duty cycle as shown in the figure below. The maximum velocity attained by the cage in m/s is



(a) 7.5 (b) 9.0 (c) 11.0 (d) 12.0

233. A centrifugal fan rotating at 500 rpm delivers 70 m^3/s of air. If the speed is reduced to 200 rpm, the quantity of air delivered in m^3/s will be

(a) 175 (b) 55 (c) 28 (d) 11

234. According to mine regulations, the value of the fleet angle á, in degree of a drum winder installation lies in the range of

(a) $1.5<\alpha\leq2.0$ (b) $0<\alpha\leq1.5$ (c) $2.0<\alpha\leq2.5$ (d) $2.5<\alpha\leq3.0$

235. Water will not be delivered by a centrifugal pump due to

(a) lack of priming (b) too low discharge head
(c) wrong direction of rotation (d) partial obstruction at discharge outlet

Linked Answer Questions

Statement for Linked Answer Questions P and Q:

A 400 V, 3 phase, star connected induction motor takes a line current of 10 A with 0.86 p.f. lagging. Total stator losses are 5 % of the input. Rotor copper losses are 4 % of the input to the rotor, and mechanical losses are 3 % of the input to the rotor.

P.The input power to the rotor in Watts is

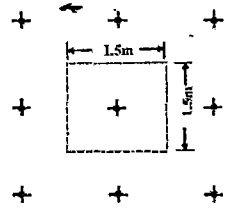
(a) 5958 (b) 5788 (c) 5660 (d) 5532

Q.The shaft output power in Watts is

(a) 5562 (b) 5490 (c) 5434 (d) 5264

Statement for Linked Answer Questions X and 5Y:

The bolts are spaced at 1.5 m centre-to-centre in a square pattern as shown in the figure below. The tensile stress in 22 mm diameter bolt rod is 193.35 MPa. The unit weight of the roof layer is 25 kN/m³.



Plan view of rock bolting pattern

X. The axial load in the bolt rod in kN is

(a) 294.0 (b) 173.5 (c) 147.0 (d) 73.5

Y. At equilibrium, the thickness of the roof layer supported by the bolt in m is

(a) 1.31 (b) 2.4 (c) 2.62 (d) 3.08

236. A flat belt conveyor is carrying coal of bulk density 1 tonne/m^3 at a rate of 400 tonne/h. The belt speed is 3 m/s. Coal is spread over the belt covering 80% of the belt width in a shape of a triangle. If the pile height is 1/4 of the belt width, the width of the belt in mm is

(a) 1109 (b) 909 (c) 709 (d) 609

237. Under standard temperature and pressure conditions the theoretical maximum height in m to which water can be lifted using an air-lift pump is

(a) 10.33 (b) 9.61 (c) 7.45 (d) 6.05

238. In a belt conveyor system, function of the snub pulley is to

(a) clean the inner surface of the belt (b) clean the outer surface of the belt
(c) increase the angle of contact of belt with drive drum
(d) decrease the belt tension

239. Koepe system of winding does not include

(a) Tapper Guide (b) Limit switch (c) Safety hook (d) Brake

240. Two belt conveyors load a ground bunker, each at a rate of 400 rph, which is initially filled with 1000 t of coal. coal is discharged from the bottom of the ground bunker onto a belt conveyor at a rate of 1200 rph. The time elapsed in hours before the bottom conveyor starts to operate below its rated capacity is

(a) 6.5 (b) 8.8 (c) 12.5 (d) 25.0

241. A 1100 V, 3x power supply system of a mine draws a load of 185 kW. The ammeter reading shows 115A. The power factor of the system is

(a) 0.84 (b) 0.73 (c) 0.64 (d) 0.48

242. A turbine pump of efficiency 75% discharges water at the rate of 2100 L/min at a total head of 100 m. If the pump is run by a motor of efficiency 90%, the input power required for the motor in kW is

(a) 22.49 (b) 34.31 (c) 44.11 (d) 54.50

243. A turbine pump of efficiency 70% discharges water at the rate of 2100 L/min at a total head of 100 m. If the velocity of water in suction and delivery pipes of the pump are 1.8 m/s and 2.5 m/s respectively, the diameter of suction and delivery pipes in cm are

(a) 15.73 and 13.35 (b) 7.86 and 6.67 (c) 5.78 and 6.02 (d) 4.97 and 4.22

244. The tool used for borehole deviation is

(a) String shot (b) Kelly (c) Whipstock (d) Rachet

245. During over-winding, a cage is safely suspended in the headgear due to

(a) Bull chain (b) Rope capel (c) D-Link (d) Detaching hook

246. In the order of the chronological development, the longwall support systems are arranged as

P - Powered support Q-Link bar and friction support
S – Frame support S-Hydraulic prop

(a) P-Q-R-S (b) R-S-Q-P (c) S-R-P-Q (d) Q-S-R-P

247. A drum winder of radius 2.5m draws power of 308kW. When the maxm. rope speed is 7m/s, the RMS torque in kNM is –

(a) 55 (b) 76 (c) 110 (d) 144

248. A belt conveyor conveys material of average cross-sectional area of 0.09 m^2, of bulk density 1.5 tonnes/m^3, at a speed 2 m/s. The carrying capacity of the belt in tone/hr is
(a) 972 (b) 864 (c) 732 (d) 643

249. A conveyor of rated power 100 kW hauls coal up-dip at 30 kg/s along an inclination of 15° and distance 300 m. Heat added by the conveyor to the air in kW is
(a) 56.4 (b) 65.9 (c) 77.2 (d) 82.3

250. A cage of floor area 5 m2 suspended in a shaft has a drag coefficient 2.5. If the velocity of air in the shaft is 6 m/s, the drag force (N) experienced by the cage is
(a) 120 (b) 170 (c) 200 (d) 270

251. In a coal handling plant wagons of 8 m length are loaded, at rake speed of 0.48 km/hr. The chute loading rate is 6000 tonne/hr. As the rake moves continuously, the chute stops for a total of 24s in between two wagons. The quantity of coal in tone loaded in each wagon is
(a) 52 (b) 60 (c) 76 (d) 94

252. A loco of mass 10000 kg has a coefficient of adhesion to the tracks as 0.25. The loco offers a running resistance equal to 10% of its weight. The draw-bar-pull generated by the loco on a level ground in kN is
(a) 11.3 (b) 14.7 (c) 15.8 (d) 17.2

253. In the above questions, the draw-bar-pull generated by the loco when the upward gradient of the track is 5° in kN is
(a) 6.16 (b) 7.9 (c) 9.5 (d) 11.5

Answer Key

1	b	2	a	3	b	4	a	5	d	6	b
7	a	8	b	9	b	10	d	11	b	12	d
13	b	14	b	15	d	16	a	17	b	18	b
19	d	20	b	21	c	22	a	23	b	24	a
25	a	26	b	27	a	28	b	29	a	30	a
31	a	32	c	33	b	34	c	35	b	36	a
37	b	38	c	39	c	40	c	41	b	42	a
43	d	44	b	45	d	46	d	47	b	48	b
49	a	50	c	51	b	52	a	53	d	54	b
55	a	56	c	57	a	58	b	59	d	60	b
61	a	62	b	63	d	64	a	65	d	66	c
67	b	68	b	69	c	70	c	71	a	72	b
73	c	74	c	75	c	76	a	77	a	78	
79	b	80	a	81	c	82	a	83	a	84	a
85	c	86	a	87	a	88	b	89	c	90	a
91	c	92	b	93	c	94	b	95	c	96	a
97	c	98	d	99	d	100	b	101	d	102	b
103	c	104	c	105	b	106	c	107	b	108	c
109	c	110	c	111	b	112	b	113	a	114	b
115	d	116	d	117	b	118	b	119	b	120	a
121	c	122	a	123	d	124	a	125	a	126	a
127	c	128	a	129	b	130	b	131	a	132	b
133	c	134	c	135	b	136	b	137	c	138	b
139	c	140	b	141	c	142	c	143	a	144	d
145	b	146	a	147	b	148	b	149	a	150	c
151	d	152	c	153	a	154	a	155	c	156	b
157	c	158	b	159	c	160	b	161	a	162	a
163	b	164	d	165	c	166	b	167	a	168	c
169	d	170	b	171	a	172	d	173	d	174	d
175	b	176	c	177	a	178	c	179	b	180	b
181	d	182	c	183	b	184	a	185	b	186	c
187	a	188	a	189	b	190	d	191	a	192	c
193	d	194	a	195	b	196	c	197	a	198	a
199	b	200	d	201	a	202	a	203	c	204	b
205	b	206	b	207	d	208	c	209	b	210	a
211	b	212	7900 to 7920	213	83 to 87	214	106 to 113	215	0.055 to 0.065	216	b
217	d	218	b	219	a	220	c	221	b	222	225 to 231
223	335 to 337	224	c	225	d	226	b	227	b	228	c
229	c	230	b	231	d	232	d	233	c	234	b
235	a,P(c), Q(d), X(d), Y(a)	236	d	237	a	238	c	239	d	240	d
241	a	242	d	243	a	244	c	245	d	246	b
247	c	248	a	249	c	250	d	251	b	252	b
253	A										

Chapter 4

Method of Work (Coal)

1. **Given the following,**

Mining method Technique	
P Thick seam extraction	1 Double unit face
Q Bord and pillar extraction	2 Jet cutting
R Longwall face development	3 Inclined slicing
S Hydraulic mining	4 Half moon

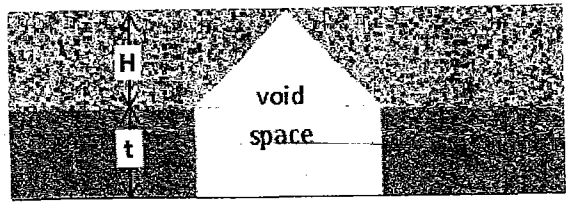
method the correct match is
(a) P-3, Q-4, R-2, S-1 (b) P-1, Q-4, R-2, S-3
(c) P-3, Q-2, R-1, S-4 (d) P-3, Q-4, R-1, S-2

2. **Maximum number of underground coal mines in India adopt this method-**
(a) Longwall mining (b) Blasting gallery
(c) Highwall mining (d) Bord & pillar mining

3. **A drive shaft of an engine develops torque of 500 N-m. It rotates at a constant speed of 50 rpm. The power transmitted by the shaft in kW**
(a) 1.46 (b) 2.05 (c) 2.62 (d) 4.32

4. **The largest area of a rectangular shaft for a given constant perimeter is obtained when length is**
(a) 2.5 times of breadth (b) 1.5 times of breadth
(c) 2.0 times of breadth (d) equal to breadth

5. **A flat coal seam of thickness (t) 3m is excavated and broken roof has completely filled the space created due to extraction as shown in the figure. If the bulking factor of roof rock is 1.2, the caving height in m is .....**



6. **In a short wall panel, coal is extracted from the face by a continuous miner having rate of production 30 tonne/h. Coal having specific gravity of 1.4 is transported by shuttle cars of capacity 0.9m³ each to a feeder breaker located at 60m from the face. If the average speed of LHD is 0.5 m/s and the total loading and unloading time of LHD is 40s, the number of LHDs required to match the production of the continuous miner is –**
(a) 1 (b) 2 (c) 3 (d) 4

7. **Horizon mining for coal winning is more suitable where:**
(a) The coal seams are horizontal.
(b) The coal seams are highly disturbed.
(c) The coal seams are slightly dipping.
(d) The coal seams are found above the earth's surface.

8. **Over 90% of underground coal production in India is from :**
(a) long wall method (b) hydraulic mining method
(c) bord & pillar method (d) blasting gallery method

9. **Adit is adopted for**
(a) a deposit having less depth of cover (b) hilly terrain
(c) a deposit having more depth of cover (d) quick return on investment

10. **Which of the below-mentioned coal subsidiary (having H.Qrs) of Coal India Limited has no underground mine?**
(a) CCL(Ranchi) (b) BCCL(Dhanbad)
(c) NCL(Singrauli) (d) WCL(Nagpur)

11. **Underground mine is best suitable when?**
(a) demand profile is maximum (b) when rehabilitation is suitable
(c) when operating cost is least
(d) when equipment procurement is easy

12. **A bord and pillar panel having square pillars is designed for 30% extraction during development. If the gallery width is 5m., the side of the pillar in m is.....**

13. **Dilatancy of rock is associated with**
(a) increase in surface area after fragmentation
(b) decrease in volume due to compression of rock
(c) increase in shear strain due to cracking of rock
(d) increase in volume due to cracking of rock

14. **For a seam to be a thick seam the thickness is more than :**
(a) 1 m (b) 2.5 m (c) 3 m (d) 4.5 m

15. **Which of the following line of the face is mostly followed during depillaring operation in India?**
(a) step diagonal (b) steep diagonal (c) diagonal (d) semi-circular

16. **In coal mining the sublevel caving with semi-mechanized wire-netting system was first practiced in which of the following colliery in India with the help of French mining engineers?**
(a) Nandira colliery (b) Girmint colliery
(c) Chirimiri colliery (d) Gidi-A colliery

17. **Commercial coal reserve expressed in Million Tonnes, is**
(a) less than geological reserve but more than workable reserve
(b) less than workable reserve but more than geological reserve
(c) more than geological reserve
(d) less than workable reserve

18. **In depillaring operation major coal losses are from**
(a) coal left in underground for unfavourable geological conditions
(b) coal left to protect surface features
(c) coal loss due to spon. heating
(d) coal left as ribs within the pillars

19. **This type of reserve is considered to calcuilate Life of a Mine -**
(a) geological reserve (b) commercial reserve
(c) workable reserve (d) inherent reserve

20. **Size of a Panel for depillaring is also influenced by -**
(a) construction of artificial panels
(b) incubation period of coal seam
(c) depth of cover
(d) systematic support of the panel

21. **OMS stands for : –**
(a) Output per man shift (b) Only mining Safety
(c) Overall Mine Safety (d) None of the above

22. **Bhaska & Tipong method was practiced in**
(a) SECL (b) NECL (c) CCL (d) WCL

23. **Which of the following method was practiced in NECL(Assam) for extraction of steep thick seam?**
(a) blasting gallery (b) sublevel caving
(c) bhaska and tipong (d) long wall

24. **Two coal seams are called contiguous if they are A m (maximum) apart from each other. A is given by**
(a) 3 m (b) 6 m (c) 9 m (d) no specific distance

25. **The parting left between any two seams or section lying within 9 m of each other shall not be less than A m thickness at any place. A is given by**
(a) 0.5 m (b) 1 m (c) 2 (d) 3 m

26. **This method is used for mining narrow veins or pay streaks, where the ore occurs as a distinct band and can be separated easily from the wall rocks. The method of mining is known as**
(a) room and pillar mining (b) wide stall method
(c) stripping (d) integral caving

27. **In this method where simultaneous development and extraction of coal is done and parallel faces are separated by a series of fender block of coal. The mining method is known as**
(a) wide stall method (b) wongawilli
(c) room and pillar (d) bord and pillar

28. **Road inside a coal seam is called**
(a) travelling road (b) gallery (c) drift (d) haulage Road

29. **Rocks are 'massive' when bedding planes are more than "A"m apart. A is given by**
(a) 0.4 m but less than 0.6 m (b) 0.6 m but less than 0.8 m
(c) 0.8 m but less than 1.2 m (d) more than 1.2 m

30. **At depth of 250m, for 4m. wide gallery and pillar size is 30m. What is the percentage extraction of coal during development.**
(a) 25% (b) 30 % (c) 18% (d) none

31. **Long wall method is:**
(a) Generally applicable to thin coal seams.
(b) Applied to deep mining.
(c) Applicable to thick coal seams.
(d) Applied to very deep mining and thick coal seams

32. **A long wall face cut by double back shuffle method can be only worked with**
(a) fixed drum shearer (b) single ended ranging drum shearer
(c) double ended ranging drum shearer (d) plough

33. **A coal seam of 2m thickness is extracted by a longwall retreating panel with face length of 120m. Web depth of the shearer is 0.6m. Average manpower in the longwall face in a shift is 20. The specific gravity of in-situ coal is 1.4. If the shearer makes 4 full-face cuts in 3 shifts, the face OMS in tonne is .....**

34. **The first caving in long wall working starts .....**
(a) it usually starts when the tensile stress in a certain point of the roof over the gob exceeds its tensile strength
(b) it starts when rooks over the gob area in compression
(c) it starts when the thickness of immediate roof increases
(d) it usually starts when the tensile remains less or to the tensile strength

35. **When the thickness of immediate roof is more than A m then it becomes stronger and behaves like a main roof? A is given by**
(a) 1 m (b) 2 m (c) 4 (d) 6 m

36. **Relationship between the side abutment pressure and Young's Modulus of the main roof after weighting.....**
(a) directly proportional (b) inversely proportional
(c) equal (d) no relation exist

37. **Which of the following actually determines the periodic weighting length in longwall working?**
(a) thickness of immediate roof (b) physical properties of main roof
(c) the stratigraphic sequence (d) compressive strength of immediate roof

38. **This controls the magnitude and direction of the front abutment pressure for immediate roof in long wall working?**
(a) Young's Modules (b) stratigraphic sequence
(c) periodic caving (d) strong main roof

39. **For long wall mining which is True ?**
(a) maximum tensile stress remains at the edge of gob
(b) maximum tensile stress remains at the centre of gob
(c) maximum tensile stress will shift from edge to centre of the gob
(d) maximum tensile stress shall remain away from the chain pillar

40. **The long wall mining method is best suitable for**
(a) flat & moderately flat seam
(b) steeply inclined seam
(c) fractured and geologically disturbed seam
(d) seam with high cavability index

41. **Quick production can be achieved from**
(a) retreating long wall mining method (b) advance long wall mining method
(c) jankowice method (d) both advancing and retreating method

42. **The face is to be developed by Road headers in before installation of a longwall equipment at face,**
(a) retreating long wall mining method
(b) advance long wall mining method
(c) both advancing and retreating method
(d) conventional longwall

43. **This statutory provision restrict the propagation of hazards from one development district to other part of the bord and pillar mine?**
(a) ventilation stopping (b) air-crossing
(c) panel system of working (d) explosion-proof stopping

44. **Over-riding of gallery incidence is most with**
(a) shortwall method (b) long wall method
(c) widestall method (d) blasting Gallery method

45. **This method of support has maximum linear progress?**
(a) timber prop (b) square chock (c) roof bolt (d) friction prop

46. **Over-ridding of pillars and maximum risk of premature collapse is with**
(a) shortwall method (b) longwall
(c) bord and pillar (d) sub-level caving

47. **In this method of thick seam mining sagging of roof and initiation of spontaneous heating is maximum observed?**
(a) descending slicing (b) ascending slicing
(c) mixed order of slicing (d) under winning integral method

48. **Sand water mixture sent to underground coal depillaring district is known as**
(a) jigging operation (b) gravity separation operation
(c) stowing operation (d) coal drawing operation

49. **The equilibrium of pre-mining forces is disturbed and re-distribution of pressures takes place with the driving of an underground gallery. This can be better-explained by**
(a) suspension theory (b) pressure-arch theory
(c) beam theory (d) key stone theory

50. **This hazard occur when the roof exposure during depillaring operation become more than 90 m^2?**
(a) coal bump (b) air blast (c) subsidence (d) explosion

51. **The common rate of sand stowing in u/g coal mine is A tons of sand per hour. Value of A is given by**
(a) 100 (b) 500 (c) 1000 (d) 1500

52. **The cutting of narrow drivages with the help of coal picks adopted at Khas Karanpura, is known as**
(a) primary cutting (b) secondary cutting
(c) mul cutting (d) pyramid cutting

53. **When the dip of the seam is more than 45°in hydraulic method of work, what should be the water requirement ?**
(a) 1 m^3/ton of coal (b) 2 m^3/ton of coal (c) 4 m^3/ton of coal (d) 6 m^3/ton of coal

54. **Coal pulp in hydraulic mining is transported by**
(a) flumes (b) belt conveyor (c) coal tub (d) scraper haulage

55. **In 'Hydraulic mining' coal is broken by -**
(a) coal drill (b) jet monitor
(c) coal cutting machine (d) blasting

56. **'Soutirage' mining is also known as -**
(a) sub level caving (b) horizon mining
(c) integral caving (d) depillaring with caving

57. **In Blasting Gallery Method, this method of drilling of face is followed?**
(a) ring hole pattern (b) burn cut pattern
(c) wadge cut (d) coromant cut

58. **In contiguous seam working, the 2 seams must be within A m of each other. A is given by**
(a) 24 m (b) 18 m (c) 12 m (d) 9 m

59. **In this method partial combustion of coal is done with an objective to extract thermal energy from the coal seam**
(a) methane drainage (b) underground coal gasification
(c) vertical drilling or raising (d) spontaneous heating

60. **In this process of extraction of soluble metal compounds by reaction with acid or basic solvents or water. Name the method -**
(a) hydraulicking (b) leaching
(c) dredging (d) placer mining

61. **At the nozzle in hydraulic mining operation, what should be the minimum pressure to be maintained?**
(a) 5 - 10 kgf/cm^2 (b) 10 - 20 kgf/cm^2
(c) 21 - 35 kgf/cm^2 (d) 40 - 100 kgf/cm^2

62. **For this method coal seam thickness to be more, regular and flat -**
(a) hydraulic mining (b) wongawilli mining
(c) blasting gallery (d) longwall mining

63. **Between two panels, what is the minimum size of barrier ?**
(a) equal to width of gallery size (b) equal to dimension of panel
(c) equal to pillar size (d) equal to face dimension

64. **Incidence of water in Indian coal seam is**
(a) very high (b) high (c) very less (d) moderate

65. **The rate of gas emission is in degree II gassy seam**
(a) less than 1 m^3ton of coal produced
(b) more than 1 m^3. but less than 5 m^3.
(c) more than 1 m^3. but less than 10 m^3.
(d) more than 10 m^3.

66. **"Goaf" with respect to Bord & Pillar or Long wall working means a place**
(a) Coal has been extracted but now not a working place
(b) Coal has been extracted but still a working place
(c) Coal is about to be extracted
(d) People has lawful access

67. **Coal seams with bad roof having strata control problems is suitable for**
(a) Bord & pillar mining (b) Blasting gallery
(c) Longwall mining (d) Hydraulic mining

68. **It is a solid block of coal surrounded on all its by galleries. This is -**
(a) coal face (b) coal roof (c) coal pillar (d) coal floor

69. **Barrier in between panels is preferably punctured at "A" number of place. A is given by**
(a) 1 (b) 2 (c) 3 (d) any number

70. **Panel barrier is punctured for**
(a) district transport (b) district return
(c) pumping water out of panel (d) to take out miners

71. **Which of the following is mainly considered for deciding size of panel in depillaring operation**
(a) volatile content of seam (b) geological considerations
(c) support system approved (d) incubation period

72. **Size of pillars is decided based on**
(a) nature of roof and floor (b) time dependent strain
(c) depth from surface (d) coal strength

73. **In an underground mine output from the panel is 360 tonnes/day, having 26 days of working in a month where incubation period of coal is 9 month. If recovery from the panel is 80% and pillar size is 30m x 30m, height 3m, sp. gravity of coal 1.8. Find out number of pillars in the panel.**
(a) 18 (b) 22 (c) 26 (d) 30

74. **Which of the following CMR provisions relate to working in section of Bord and Pillar method ?**
(a) CMR 116A & Circular 5/2002 (b) CMR 117 & Circular 6/2002
(c) CMR 118A & Circular 5/1972 (d) CMR 122 & Circular 6/1972

75. **Which of the following statement is true for panel system of working?**
(a) control of subsidence is difficult and crushing of pillars happens
(b) chances for spon heating is maximum resulting in closure of mines
(c) it has independent transport, ventilation and loading system
(d) crushing of barriers may result in joining of 2 faces

76. **To estimate appropriate air requirement in underground mine which of the following is true?**
(a) exact manpower employed in the district
(b) exact daily tone output
(c) size of the mine
(d) persons employed in the district and daily tone output

77. **When prominent cleavages or geological disturbances are come across in coal mine, the intake and return airways shall be at a distance away equal t**
(a) one pillar length (b) two pillars length
(c) 180m apart (d) 360m apart

78. **Below ground face loading machinery output is influenced by -**
(a) solid blasting technique (b) pull
(c) lead distance (d) all are true

79. **Maximum number of faces possible in a 6 heading Bord & Pillar district is**
(a) 12 (b) 14 (c) 16 (d) 20

80. **In which condition Bord & Pillar district is not permitted?**
(a) rise face in the top most heading
(b) rise face of top heading and dip face of bottom most heading
(c) dip face of any heading
(d) any rise face

81. **Where seam thickness is more than 8m and regular, dip <60°, roof & floor is strong and coal is not liable to spontaneous heating with easily cavable roof Which of the following method is suitable?**
(a) inclined ascending slicing (b) horizontal slicing
(c) diagonal slicing (d) transverse slicing in descending order

82. **Which of the following thick seam methods can be suitably applied for a deposit of any shape containing both hard and weak coals, self igniting and emitting firedamp where stability of wall rocks is of no importance**
(a) blasting gallery (b) inclined slicing
(c) horizontal slicing (d) sub-level caving

83. **In gassy mine being worked by soutirage method which of the following method of blasting is preferred?**
(a) solid blasting (b) cone blasting
(c) camouflage blasting (d) coromant cut blasting

84. **Best production from SDL mining is expected from -**
(a) 3 level heading district (b) 4 level heading district
(c) 5 level heading district (d) 6 level heading district

85. **Six 100w bulbs at a distance of 6m gives a lighting of**
(a) 0.5 lumen/ft² (b) 1 lumen/ft²
(c) 1.5 lumen/ft² (d) 3 lumen/ft²

86. **What is the standard of lighting at the pit bottom of Indian mines?**
(a) 0.4 lumen/ft² (b) 1.25 lumen/ft²
(c) 2 lumen/ft² (d) 3 lumen/ft²

87. **The use of Fluid Expandable Rock Bots shall be discontinued whenever the anchorage strength measured is less than**
(a) 18 tonnes (b) 15 tonnes (c) 12 tonnes (d) none

88. **A developed panel for a coal seam having incubation period of 6 months has 32 square pillars under extraction having size 25m, and height 3.0m. Density of coal is 1.4 tonne/m³. Extraction ratio during depillaring is expected to be 75%. To depillar the panel within the incubation period, assuming 25 working days in a month, the production from the panel in tonne/day is –**
(a) 420 (b) 480 (c) 560 (d) 680

Answer Key

1	d	2	d	3	c	4	d	5	30 to 30	6	b
7	d	8	c	9	b	10	c	11	c	12	25 to 26
13	d	14	d	15	c	16	d	17	d	18	d
19	b	20	b	21	a	22	b	23	c	24	c
25	d	26	c	27	b	28	b	29	d	30	a
31	a	32	c	33	13 to 14	34	a	35	d	36	b
37	b	38	a	39	b	40	a	41	b	42	a
43	c	44	d	45	c	46	c	47	b	48	c
49	b	50	b	51	a	52	c	53	a	54	a
55	b	56	c	57	a	58	d	59	b	60	b
61	d	62	c	63	c	64	d	65	c	66	a
67	c	68	c	69	a	70	b	71	d	72	c
73	b	74	c	75	c	76	d	77	b	78	d
79	c	80	b	81	a	82	c	83	c	84	c
85	c	86	d	87	c	88					

Chapter 5

Drilling & Blasting

(Selected Reference : Explosives & Blasting Technique, 3rd Enlarged Edition (2015), by G.K.Pradhan, Mintech Publications, Bhubaneswar)

UG Blasting

1. **In CMR it is stated that, when two working places below ground have approached within a ..... meter of each other, the shot firer shall fire in any of the two faces only.**
(a) 4.5 m (b) 8.5 m (c) 15 m (d) 18 m

2. **In solid blasting, the available delay number with copper tube is -**
(a) 0 – 3 (b) 0 – 6 (c) 0 – 10 (d) 0 – 20

3. **Provisions of CMR/MMR stipulates that, the key of the firing apparatus shall be retained throughout the shift in the possession of -**
(a) mining sirdar or mining mate (b) over man or foreman
(c) explosive (d) shot firer or blaster

4. **In no case shall the well insulated blasting or shot firing cable be less than ..... m long.**
(a) 12 m (b) 14 m (c) 16 m (d) 18 m

5. **Insufficient stemming causes -**
(a) over breakage of coal (b) excessive vibration
(c) blown out shot (d) high power factor

6. **The following patterns are used in drifting**
a) Wedge cut b) Burn cut c) Parallel hole cut d) All above

7. **Which of the following explosive are recommended for solid blasting practice in underground coal mine?**
(a) gunpowder + LOX (b) Primer + ANFO
(c) Bulk Site Mixed Emulsion (d) None of the above

8. **P5 permitted explosives used in 'solid blasting' in underground coal mine is initiated by**
   (a) Instantaneous detonator
   (b)Short delay aluminium incendive detonator
   (c) Carrick short delay non-incendive detonator
   (d) Aluminium based long delay detonators

9. **Delay detonators used in solid blasting have delay range of**
   (a) 0-6, (b) 0-8, (c) 0-10 (d) none of the above.

10. **In solid blasting practice which of the following type of initiation is preferred?**
    (a) direct (b) inverse (c) direct & inverse (d) split

11. **An emulsion explosive having specific gravity 1.25 is used for blasting in an iron ore formation having P-wave velocity of 3000 m/s and specific gravity of 3.20. For an explosive impedance to rock impedance ratio of 0.5, the desired velocity of detonation of the explosive in m/s is –**
    (a) 3840 (b) 4000 (c) 4200 (d) 7680

12. **Calculate the total resistance for 20 numbers of electric delay detonators connected in parallel, each detonator has resistance of 2 ohms and resistance of connecting wire blasting is 8 ohms and 3 ohms respectively?**
    (a) 8.1 ohms (b) 9.1 ohms (c) 10.1 ohms (d) 11.1 ohms

13. **Blasting Gallery method is not suitable for working seam thickness**
    (a) Less than 7m (b) More than 7m (c) Up to 11m (d) More than 11m

14. **Which cut is used for solid blasting in Indian coal Mines**
    (a) fan cut (b) burn cut (c) wedge cut (d) drag cut

15. **Permitted explosives are safe to use because**
    (a) they have less strength
    (b) they have low velocity of detonation
    (c) they do not produce much noise during blasting
    (d) special chemical are used to extinguish flame

16. **Burden is the distance between**
    (a) two blast holes in same row
    (b) distance between two rows
    (c) distance between first row of blast holes and bench
    (d) none of the above

17. **In a 4.2 m wide and 3.0 m high gallery in a coal seam, twelve shot holes are blasted per round. The holes are charged with 2 explosive cartridges of 435gm each.If the powder factor is 2.2 tonne/kg and specific gravity of coal is 1.4 m, the pull per round in m is –**
    (a) 1.45 (b) 1.70 (c) 1.30 (d) 4.06

18. **In a room-and-pillar stope, bench blasting is conducted using ANFO having density of 800kg/m³. The specific gravity of rock is 2.5, hole dia. is 100mm and spacing ratio is 1.3. The charge length of each blast hole is 80% of the hole length. For a desired powder factor of 0.48 kg/tonne, the spacing and burden of the blast pattern in mm respectively are :**
    (a) 2.0, 2.6 (b) 2.3, 1.8 (c) 5.2, 4.0 (d)1.3, 1.0

19. **Uncharged hole in any drift or face blasting pattern helps in providing**
    a) Free face to the other holes b) For better alignment
    c) For avoiding fly rocks d) None of the above

20. **While charging of holes in burn cut or wedge cut the periphery holes are charged explosives**
    a) Same as explosive charge in other holes
    b) Less than the explosive charged into other holes
    c) More than explosive charged into other holes
    d) None of the above

21. **While blasting in a shaft sinking operation a thin seam of coal is encountered. Which type of explosive has to be used**
    a) Non-permitted explosive b) Permitted explosive
    c) Ammonium Nitrate Fuel Oil d) None of the above

Drilling

22. **Match the following for a drilling system**

Component	Function
P. Drill	1. Utilization of energy in fragmentation of rock
Q. Drill rod	2. Reduction of energy loss due to regrinding
R. Drill bit	3. Conversion of original form of energy into mechanical energy
S.Flushing medium	4. Transmission of energy from prime mover to applicator

    (a) P-3, Q-1, R-2, S-4 (b) P-4, Q-1, R-3, S-2
    (c) P-3, Q-4, R-1, S-2 (d) P-2, Q-1,R-3, S-4

23. **Among the following options, the specific energy for rock-drilling is lowest in**
    (a) rotary diamond drilling (b) rotary roller drilling
    (c) percussive drilling (d) jet piercing

24. **Sub-grade Drilling in blasting is normally recommended for**
a) 10% in excess of the blast hole depth
b) 15% in excess of the blast hole depth
c) 20% in excess of the blast hole depth
d) None of the above

25. **Match correctly for method of drilling given in column A to principle of rock cutting in column B.**

Column A (Method of drilling)	Column B (Principle of rock cutting)
(i) Diamond drilling	(a) Impact action
(ii) Percussive drilling	(b) Thermal spalling
(iii) Rotary roller drilling	(c) Rotary abrasive
(iv) Jet piercing	(d) Cutting & ploughing

Ans.: (i) +(c) (ii)+(a) (iii)+(d) (iv)+(b)

26. **Long-hole drilling with crater blasting is used for the construction of**
(a)winze (b) shaft (c) raise (d) decline

27. **Among the following options, the specific energy for rock-drilling is lowest in**
(a)rotary diamond drilling (b)rotary roller drilling
(c) percussive drilling (d) jet piercing

28. **The rotational speed and cutting velocity of a drill are 350 rpm and 71.50 m/min respectively. The diameter of the rotary drill bit in mm is**
(a) 65 (b) 67 (c) 68 (d) 70

29. **Hole is drilled by striking a number of blows at short intervals on the rock by a chisel type tool and between the blows the tool is rotated. Thos method of drilling is called**
(a) rotary drilling (b) percussive drilling
(c) diamond drilling (d) hydraulic drilling

30. **In this drilling process, holes can be drilled from surface or underground working at any angle to the horizontal and used for coring. This is called**
(a) churn drilling (b) percussive drilling by rods
(c) diamond drilling (d) tubular drilling

31. **Holes get filled with drill cuttings and need to be cleaned out frequently. This is done with the help of**
(a) derrick (b) calyx shot drilling
(c) sludger (d) v-chisel

32. **When a rod or chisel breaks in the drill hole during drilling process. Name the device that helps to catch the broken price**
(a) crow's foot (b) picker
(c) liner (d) churn bit

33. **This helps in better recovery of core from soft rock?**
(a) single tube core barrel (b) double tube core barrel
(c) saw toothed crown (d) roller bits

34. **This apparatus is used, when in an underground working, the face for drilling has approached water logged zone.**
(a) jack hammer (b) hand held electric drill
(c) auger drill (d) burn side boring apparatus

Properties of Explosives

35. **Low shock and high gas pressure explosive is generally used for blasting of**
(a) hard and brittle rock mass (b) soft and jointed rock mass
(c) hard and massive intact rock mass (d) soft and massive intact rock mass

36. **Gunpowder explosive initiated by plain detonator and safety fuse is also**
a) Low explosive b) High explosive
c) Slurry explosive d) None of the above

37. **Only this type of explosive is used in small dia. blasting**
a) Cap sensitive explosive b) Non-cap sensitive explosives
c) Column explosive d) None of the above

38. **When explosive charged in a hole is separated by air gaps instead of stemming materials then the process is known as**
(a) deck loading (b) air decking
(c) detonating (d) priming

39. **Air-deck method is used for –**
(a) Pre-splitting (b) Vibration control (c) Better fragmentation (d) All the above

40. **Self life of any explosive or blasting accessories help in**
a) Reducing chances of misfire
b) Generation of boulders
c) Reduction in energy content of explosives
d) All the above

41. **This is not the property of explosive**
a) Velocity of Detonation (in m/sec) b) Density (gm/cc)
c) Compressive strength (MPa) d) Energy content in (Kcal/kg)

42. **In the manufacturing of explosives, this chemical is an oxidiser**
a) Ammonium Nitrate b) Charcoal
c) Aluminium powder d) Magnesium carbonate

43. **Base charge and Prime charge in any detonator comprises of**
a) ASA and PETN b) Ammonium Nitrate and PETN
c) AS and Ammonium Nitrate d) None of the above

44. **VOD – Velocity of detonation expressed in m/sec of Ammonium Nitrate Fuel Oil (ANFO) is**
a) 2500 b) 4000 c) 4500 d) 4800

45. **Cast boosters are used in**
a) As a primer with bulk SME explosives
b) As a primer in underground coal mine
c) As a primer in blasting-off-the-solid
d) None of the above

Types of Explosives & Accessories

46. **Liquid Oxygen is banned for use in blasting**
a) Coal b) Metal mines c) Stone quarries d) None of the above

47. **Ammonium Nitrate and Fuel give excellent result with**
a) A mix of 94 % AN and 6 % Diesel
b) A mix of 90 % AN and 10% Diesel
c) A mix of 92 % AN and 8% Diesel
d) None of the above

48. **Delay element in a delay detonator is placed between**
a) Base charge and priming charge b) Fuse head and priming charge
c) Neoprene plug and base charge d) Detonator tube and fuse head

49. **While using detonating cord or detonating fuse some quantities of explosive is .....**
(lost or damaged)

50. **In an explosive formulation this is an oxidizing agent -**
(a) charcoal (b) aluminum
(c) ammonium nitrate (d) magnesium carbonate

51. **Which of the following is used as a fuel in an explosive?**
(a) sodium nitrate (b) sulphur
(c) sodium chloride (d) nitroglycerine

52. **Which of the following is a base explosive?**
(a) gun powder (b) potassium nitrate
(c) Nacl (d) TNT

53. **Which of the following is added as sensitizers is explosive?**
(a) Nacl (b) NH_4NO_3
(c) NG (d) Charcoal

54. **Which of the following reagents do share around maximum percentage in an explosive?**
(a) oxidizing agent (b) explosive base
(c) combustible substances (d) sensitizers

55. **Which of the following cannot be used in watery strata?**
(a) Ammonium Nitrate Fuel Oil (b) Slurry explosive
(c) Emulsion (d) None

56. **The chemical is added to give sheath in a permitted sheathed explosive?**
(a) Nacl (b) NG
(c) $NaHCO_3$ (d) Charcoal

57. **This type of explosive is banned in India**
a) NG based explosive b) Slurry explosive
c) Emulsion explosive d) Gun powder

58. **Which of the following explosive have maximum strength**
(a) ANFO (b) TNT (c) RDX (d) Nitroglycerine

59. **Which of the following explosive are recommended for dry deep hole blasting**
(a) Booster & ANFO (b) Column charge
(c) only Bulk SME (d) None of the above

60. **Which of the following prime characteristic the nonel blasting has?**
(a) it has greater shock to the surrounding (b) it is noiseless in character
(c) it has tremendous effect on explosive column
(d) it cannot be used in a place where there is a chance of stray current

61. **Detonating cord or detonating fuse releases of –**
(a) Sound (b) Dust (c) Heat (d) None

62. **In exploration for oil and natural gas and minerals this type of detonator is used**
a) Seismic (b) Shock tube (c) Cord delay detonator (d) None of the above

63. **Electric circuit for blasting is tested by using**
a)Exploder (b) Tachometer (c) Blastometer (d)Crimper

64. **Shock tubes are used for**
a) In the hole initiation b) To separate charge of explosive within the hole
c) For better fragmentation d) All the above

65. **In shock tubes PETN charge is –**
a) Distributed at 5 gm/m b) Distribute at 10 gm/m
c) Distribute at 20 gm/m d) None of the above

Blasting

66. **Deep hole blasting permission for use of approved type of bulk SME explosive is granted by :**
a) Mine Manager b) Director of Mines Safety
c) Agent of the mine d) Dy. Director of Mines Safety

67. **In air-deck method this is used –**
(a) Drill cuttings in deck area (b) chemically activated gas bag
(c) Wooden plug (d) None of the above

68. **Decking using drill cuttings are used in stemming for**
a) Distribution of explosive energy uniformly in the blast hole
b) Saving explosive c) Reducing blasting cost
d) None of the above

69. **Electronic delay detonators are used in almost all the blasts conducted at –**
(a) Jayant Opencast Mine (b) Rampura-Agucha Pb-Zinc Mine of HZL
(c) Kiriburu Iron Ore Mine of SAIL (d) None of the above

70. **Electric detonators are fired by a DGMS approved type portable apparatus-**
(a) Dynamo (b) Battery charger (c) Exploder (d) None

71. **An emulsion explosive of specific gravity 1.25 is used for blasting in an iron ore formation having P-wave velocity of 3000 m/s and specific gravity of 3.20. For an explosive impedance to rock impedance ratio of 0.5, the desired velocity of detonation of the explosive in m/s is**
(a) 3840 (b) 4000 (c) 4200 (d) 7680

72. **20 plain detonators in series, each of 2 W resistance, are fired by a DC exploder supplying a current of 1.25 A. If 250 mJ energy is spent to fire the detonators, the time required in millisecond after detonator initiation is**
(a) 4 (b) 8 (c) 12 (d) 16

73. **The weight strength of ANFO of specific gravity of 0.8 is 912 kcal/kg.The weight strength of an emulsion explosive of specific gravity 1.2 is 850 kcal/kg. Bulk strength of the emulsion explosive relative to ANFO in percentage is .....**

74. **Drill cuttings used in stemming in deep hole blasting is**
a) Very good available stemming material b) Poor stemming material
c) Right type of stemming material d) None of the above

75. **Optimum blast is -**
a) Having oversize boulders b) Having toe
c) Having scattered muck pile d) None of the above

76. **This is not a secondary blasting term**
a) Pop shooting b) Plaster shooting
c) Deep hole blasting d) Plasma blasting

77. **While using detonating cord or detonating fuse the following problem arises**
a) Not giving in-hole delay detonation b) Generate excessive sound level
c) Result damage to some quantity of explosive charge in the hole
d) All the above

Bulk Explosives

78. **Site Mixed slurry explosive is only used at Malanjkhand Copper Mine and Iron Ore mines of Barbil-Barajamda region –**
(a) Due to its multi product delivery
(b) Due to charging varying explosive density
(c) Due to flexibility to vary explosive energy content expressed in Kcal/kg.
(d) All the above

79. **Explosive energy in SME(Site Mixed Emulsion) Explosive can be varied at the site of charging in opencast bench is by –**
(a) addition of AN-prills (b) addition of Nacl
(c) Addition of diesel (d) None of the above

80. **Premises for storage of SME (Site Mixed Emulsion) Matrix is known as –**
(a) Magazine (b) Godown
(c) Support or Satellite Plant (d) None of the above

81. To measure the performance of blasting which factor is calculated

(a) tonnage factor (b) space factor
(c) stripping ratio (d) powder factor

82. Emulsion explosive is mixture of

(a) Ammonium nitrate, TNT, NG
(b) Ammonium nitrate, TNT, guar gum
(c) Ammonium nitrate, NG, water
(d) Ammonium nitrate, water, hollow micro-ballons

83. SME explosive uses the delivery vehicle known as –

(a) Dumper (b) Truck (c) Explosive Van (d) BMD Vehicle

84. SME explosive is formed when it is charged into the blast hole. Before it is mixed in a BMD vehicle near the site of blasting with gassing agent, it is known –

(a) Non-explosive matrix (b) Cap sensitive
(c) Column charge (d) None

85. In underground excavations electronic delay detonators are preferred for –

(a) Reduction in blast vibration level
(b) Accuracy in delay timings
(c) Better fragmentation
(d) All the above

86. While parking a BMD vehicle near the blast site, the first safety to be taken is –

(a) Putting the hand break
(b) Wooden stopper to be used on all the wheels
(c) Making the entire pump truck earthed by means of a steel chain suspended from the pump truck to the ground.
(d) All the above

87. Before charging SME into the blast hole from a BMD vehicle, we take samples in a designated aluminium cup to measure –

(a) VOD
(b) Cup density
(c) Air gap sensitivity
(d) None of the above

Blast Vibration & Problems

88. DGMS Standards for permissible limit of ground vibration

Type of structures	Dominant excitation frequency, Hz		
	<8 Hz	8-25 Hz	>25 Hz
(A) Buildings/structures not belonging to the owner			
1. Domestic houses/structures (Kuccha, bricks & Cement)	5	10	15
2.Industrial building 3. Objectives of historical importance & sensitive Structures	10	20	25
	2	5	10
(B) Buildings/structures belonging to the owner with limited san of life			
1. Domestic houses/structures	10	15	20
2. Industrial buildings	15	25	50

In a hospital near the mine, it was reported regular complaints due to blast vibration.What should be the level of blast vibration and frequency so that the recorded levels are within DGMS standards ?

Ans: For, 8 Hz frequency the vibration level should not exceed 2 m/sec, for 8 to 25 Hz frequency it should not exceed 20 m/sec and for frequency of >25 Hz it should be within 10 m/sec.

89. Pop shooting or plaster shooting is a type of

(a) primary blasting (b) secondary blasting
(c) muffling (d) clay capping

90. By using shock tubes (also known as NONEL or EXEL or Raydet brand names), we get benefit Controlling blast induced .....

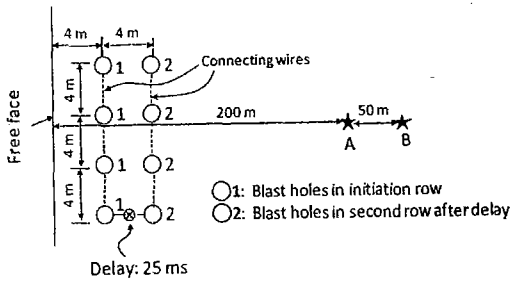
(a)ground vibration (b) true bottom priming
(c) less incidence of noise (d) All above

91. PPV expressed in m/sec is the term used for

(a)Blast induced ground vibration level (b) Fly rocks
(c) Misfires (d) Boulders

92. **Single most factor which influences in reduction in blast induced ground vibration level**
(a) Maximum delay timing (b) Maximum charge per delay
(c) Maximum quantity of hole (d) None of the above

93. **Peak Particle Velocity (PPV) at points A and B are measured for a blast pattern as shown in the figure**



The relevant data are :
Amount of explosives per hole in the 1st Row : 500 kg
Amount of explosives per hole in the 2nd Row : 475 kg
PPV at point A : 18 mm/sec
PPV at point B : 10 mm/sec
Considering the following relationship –

$$PPV = K\left(\frac{D}{\sqrt{Q}}\right)^{-n}, \text{ mm/s}$$

where D (in m) denotes the distance from the blast row to the measuring point and Q(in kg), maximum charge per delay. The site constants K and *n* respectively are
(a) 1002, 3.13 (b) 622, 2.92 (c) 823, 2.59, (d) 1245, 2.99

94. **For a 25 mm diameter spherical charge, the maximum allowable charge length in cm is**
(a) 15.0 (b) 25.0 (c) 30.0 (d) 150.0

95. **How much quality of air should be conducted up to each face where solid blasting is practiced?**
(a) 244 m^3/min (b) 264 m^3/min (c) 284 m^3/min (d) 400 m^3/min

96. **This licensed storage premises meant for explosives and detonators separately is known as -**
(a) shelter (b) magazine (c) store (d) house

97. **This drilling pattern is followed in underground coal mine -**
(a) wedge cut (b) fan cut (c) coroment cut (d) drag cut

98. **DGMS approved type portable apparatus, which provides the current necessary for firing Electric detonators are fired by**
(a) charger (b) exploder (c) condenser (d) dynamo

Explosives & Accessories

99. **PETN, used in detonating fuse is -**
(a) penta etharane tetra nitrate (b) penta erythritol trinitrate
(c) penta eryhthritol tetra nitrate (d) penta ethane tolluine nitrogen

100. **Ordinary electric detonator is of this type -**
(a) instantaneous type (b) delay type
(c) plain detonator (d) fired by safety fuse

101. **Delay element in a detonator is inserted between**
(a) priming charge and base charge (b) fuse head and priming charge
(c) neoprene plug and neoprene sleeve (d) detonator tube and fuse head

102. **In oil and mineral prospecting, this type of detonator is used -**
(a) plain detonators (b) electric short delay detonators
(c) ordinary long delay detonators (d) seismic detonators

103. **A detonating fuse or cord is used in**
(a) in solid blasting (b) tunneling (c) drift (d) deep hole blasting

104. **Detonating relays or cord relays are generally used for the purpose of blasting in**
(a) drift (b) cross-cut (c) solid blasting face (d) opencast working

105. **Continuity of an electric circuit for blasting is done carried out by –**
(a) techeometer (b) blastometer (c) blast scarper (d) blast crimper

Blasting Pattern

106. **In small drifts,the drilling pattern followed is -**
(a) wedge cut (b) fan cut (c) drag cut (d) burn cut

107. **Higher pull or advance per round of blasting in tunnels or drifts is achieved with -**
(a) wedge cut (b) horizontal drilling
(c) pyramid cut (d) coromant cut

108. This factor does not influence the efficient breakage of rock?
(a) type of explosive (b) amount of charge per hole
(c) type of exploder (d) length and type of stemming

109. This factor does not influence upon the amount of explosive to be charged in a single shot hole -
(a) depth of hole (b) nature of strata to be broken
(c) hole diameter (d) quality of detonating fuse

110. In opencast mines, deck charging is adopted in blast holes when the -
(a) strata is soft
(b) strata consists has watery zones
(c) strata consists of alternate band(s) of hard and softer rocks
(d) none of the above

Explosive Safety in Use & Handling

111. In blasting-off-the-solid, P5 explosives are initiated by
(a) instantaneous type detonators
(b) short delay aluminum incendive detonators
(c) carrick short delay non-incendive detonators
(d) aluminum based long delay detonators

112. An explosives magazine may be located near which of the following?
(a) power lines, (b) fuel storage areas,
(c) damp, moisture laden areas, (d) heavily populated areas,
(e) none of the above.

113. Insufficient stemming result in
(a) Excessive crushing of the rock (b) Excessive vibration level
(c) Blown out shot (d) Reduction in fly rocks

114. DGMS has strictly laid down use of explosives and detonating cord in hot holes if
(a) The holes are cracked (b) When water fills the holes
(c)Holes having punctured into the goaf area (d) None of the above

115. Explosives should never be stored with:
(a) Cast boosters, (b) detonating cord,
(c) non-electric or other blasting caps, (d) all of the above

116. When drill holes on the top row of any heading are not properly aligned and blasted can cause –
(a) Misfire (b) Over break of the roof (c) Noise (d) None of the above

117. It is recommended to not to use explosives of different manufacturers in the same hole.
a) Due to less powder factor b) Chances of misfire
c) Due to accidental blasting d) None of the above

118. By giving an air deck using chemically activated air-bag we obtain
a) Uniform fragmentation b) Excessive boulders
c) Very high fly rock d) None of the above

119. As per provision of regulation 170 (1a)(b) of CMR 1957 danger zone in an area falling a radius of .....
(a) 100m (b) 150m (c) 200m (d) 300m

120. While blasting in hot strata the temperature of hole should not exceed
(a) 50°c (b) 60°c (c) 70°c (d) None of the above

121. Fly rocks during opencast blasting is controlled by
(a) Pop shooting (b) Plaster shooting (c) muffled blasting (d) overcharging

122. While dealing with Misfire shot the relieving hole is drilled at a distance not less than
(a) 10cm (b) 20cm (c) 30cm (d) 40cm

123. In solid blasting system the maximum charge in a shot hole should not exceed
(a) 150 gm (b) 250 gm (c) 335 gm (d) 565 gm

124. Which of the following characteristics in blasting method is essential to minimize of waste rocks with coal?
(a) flat gradient (b) regular seam characteristics
(c) friable characteristics (d) less gassy seam

125. Danger of air blast is maximum with
(a) stope and pillar mining (b) cut and fill stoping
(c) blasting gallery (d) shrinkage stoping

126. Which type of drilling pattern is generally followed in solid blasting face?
(a) burn cut (b) cormorant cut (c) pyramid cut (d) wedge cut

127. According to CMR, what is the maximum permissible charge per hole?
(a) 265 gm (b) 365 gm (c) 465 gm (d) 565 gm

128. The maximum number of shots fired in any shift by using a multi-shot exploder by a shotfirer
(a) 40 (b) 60 (c) 80 (d) 160

129. No drill shall be used for boring a shot hole unless it allows a clearance of at least "A" cm over the diameter of the explosive cartridge. A is given by
(a) 0.5 (b) 1 (c) 2 (d) 3

130. No shot shall be fired unless the length of fuse is at least "A" meter. A is given by
(a) 1.2 m (b) 1.8 m (c) 2.5 m (d) 4 m

131. The shotfirer shall not fire more than "A" shots in one round of blasting
(a) 10 (b) 15 (c) 25 (d) 50

132. Misfire is not caused due to –
(a) Poor quality of explosive (b) Poor quality of detonator
(c) Hole depth (d) Continuity in the circuit.

133. While handling misfires a relieving hole shall be so placed that at no point shall it be nearer than 'A' cm from the misfired hole. A is given by
(a) 5 cm (b) 15 cm (c) 20 cm (d) 30 cm

134. Dealing with misfires is stated under .....regulation of CMR 1957.
(a) 168 (b) 169 (c) 177 (d) 178

135. Permanent buildings or structures not belonging to the owner lies within the danger zone, of an opencast mine, the aggregate maximum charge in all holes fired at one time shall not exceed -
(a) 565 gm (b) 1 Kg (c) 2 Kg (d) 2.75 Kg

TRUE/FALSE

136. Mobile instrument has been banned by DGMS through a Circular near the site of blasting, near and inside the priming station, near the BMD vehicle etc.
TrueFalse

137. In air decking, in a blast hole charged with Bulk SME explosives, multiple priming is not required.
True/False

138. Explosive magazines should not be identifiable as such to the general public.
True/ False

139. Explosives and detonators must always be transported separately.
True /False

140. Never transport people or other materials in the explosive van along with blasting materials.
True /False

141. Warning sign is needed on vehicles transporting explosives as per provisions of Indian Explosive Rules, 2008.
True/ False

142. Modern explosives are safe enough to be handled by personnel without special training.
True/ False

143. If sensitive body areas are contacted by explosives material, they should be flushed with large quantities of water.
True/False

144. Only major roads leading to the blast site need guarding during a blast.
True/ False

145. The guarding of haulage roads into the blast area is limited to active haul roads only.
True/ False

146. Visual warning signals prior to a blast are an acceptable alternative to audible warning signals.
True/ False

147. Prearranged signals and blasting time to be displayed at prominent places of entry into the mine or site of blasting.
True/ False

148. Flyrock is a minor safety concern during blasting.
True/ False

149. Keeping to the same blasting schedule from shot to shot minimizes fly rock damage.
True /False

150. **Deteriorated or damaged explosives are not dangerous.**
True/ False

151. **Never reuse any explosive material packaging.**
True /False

152. **Never burn explosive materials packaging card board boxes in a confined area.**
True /False

153. **Stay away from blast area until fumes, dusts or mists have subsided. Never breathe dusts or vapors from explosive materials.**
True /False

154. **Misfires in muck piles are of little danger to large equipment.**
True/ False

155. **Only an experienced competent person, knowledgeable of the blast design, locations and types of explosive materials, should handle misfires.**
True /False

156. **Bulk Explosives (SME or SMS) is expensive when the quantity of explosive used in a mine is less than 500 T per year.**
True/False

157. **Pump truck carrying non-explosive emulsion matrix has to be parked in a designated area in the mine not having overhead power line, parking of other vehicles, rest shelter of mine workers.**
True/False

158. **While placing the geo-phone for recording blast induced ground vibration level, it must be placed on a solid ground to record accurate readings.**
True/False

159. **Low frequency has more damaging effect**
True/False

160. Cord relay delay detonators are used in underground coal mines.
True/False

161. Bolts used for Mini-mat should always be put in at a slight angle from perpendicular.
True / False

162. **If Ammonium Nitrate prills are stored in a support plant or satellite plant meant for SME (Site Mixed Emulsion) Matrix, this Rule is applicable –**
(a) AN Rules 2012 (b) CMR (b) MMR – (d) None of the above

Answer Key

UG Blasting

1. (a)
2. (b)
3. (d)
4. (d)
5. (c)
6. (d)
7. (d)
8. (c)
9. (a)
10. (b)
11. (a)
12. (d)
13. Blasting Gallery method is not suitable for working seam thickness
(a) Less than 7m(b) More than 7m (c) Up to 11m
(d) More than 11m
14. (b)
15. (d)
16. (c)
17. (c)
18. (b)
19. (a)
20. (b)
21.
22. (c)
23. (c)
24. (a)
25. Ans.: (i) +(c) (ii)+(a) (iii)+(d) (iv)+(b)
26. (c)
27. (c)
28. (c)
29. (b)
30. (c)
31. (c)
32. (a)
33. (b)
34. (d)
35. (b)
36. (a)
37. (a)
38. (b)
39. (d)
40. (d)
41. (c)
42. (a)
43. (a)
44. (a)
45. (a)
46. (a)
47. (a)
48. (c)
49. lost or damaged
50. (c)
51. (b)
52. (d)
53. (c)
54. (a)
55. (a)
56. (c)
57. (a)
58. (c)
59. (a)
60. (b)
61. (a)
62. (a)
63. (c)
64. (d)
65. (d)
66. (b)
67. (b)
68. (b)
69. (a)
70. (c)
71. (a)
72. (a)
73. Ans. 135 to 142.
74. (a)
75. (d)
76. (c)
77. (d)
78. (d)
79. (a)
80. (c)
81. (d)
82. (d)
83. (d)
84. (a)
85. (d)
86. (d)
87. (b)
88. For, 8 Hz frequency the vibration level should no exceed 2 m/sec, for 8 to 25 Hz frequency it should no exceed 20 m/sec and fo frequency of >25 Hz i should be within 10 m/sec
89. (b)
90. (d)
91. (d)
92. (b)
93. (c)

94. (a)
95. (c)
96. (b)
97. (a)
98. (b)
99. (c)
100. (a)
101. (b)
102. (d)
103. (d)
104. (d)
105. (b)
106. (c)
107. (d)
108. (c)
109. (d)
110. (c)
111. (c)
112. (e)
113. (c)
114. (a)
115. (d)
116. (b)
117. (b)
118. (a)
119. (d)
120. (a)
121. (c)
122.
123. (d)
124. (b)
125.
126. (d)
127. (d)
128. (c)
129. (d)
130. (a)
131. (c)
132. (c)
133. (d)
134. (c)
135. (c)
136. TRue
137. True
138. True
139. True
140. True
141. True
142. False
143. True
144. False
145. False
146. False
147. True
148. False
149. True
150. False
151. True
152. True
153. True
154. False
155. True
156. True
157. True
158. True
159. True
160. False
161. False
162. (a)

Chapter 6

Mine Legislation and General Safety

Mines Act

1. **Act not to apply which excavation is being made for prospecting purposes only and not more than .....persons are employed on any one day ?**
   (a) 15 (b) 20 (c) 25 (d) 30

2. **Act not to apply which excavation is being made for prospecting purposes only and the depth of the excavation measured from its highest to its lowest point nowhere exceeds .... and in coal it is....?**
   (a) 15 m; 6m (b) 10 m ; 6 m (c) 6m;15m (d) 10m;20m

3. **In opencast working if the depth of excavation is not exceed ....then Mines Act shall not be applied?**
   (a) 6 m (b) 10 m (c) 3 m (d) 15 m

4. **Mines Act comes into force on?**
   (a) 1st July 1952 (b) 27th May 1952
   (c) 15th March 1952 (d) None

5. **Act not to apply in the extraction of?**
   (a) Laterite (b) Limestone (c) Ordinary clay (d) All the above

6. **Act not to apply where it is in opencast working the number of persons employed on any day does not exceed...?**
   (a) 20 (b) 40 (c) 50 (d) 100

7. **Who is appointed as the chairman of the 'committee' made under the section 12 of Mines Act 1952 to consider the proposal for making rules & regulation under the Act?**
   (a) a person in the service of the Government not being the Chief Inspector
   (b) any inspector (c) a qualified Mining Engineer
   (d) Owner of the mine

8. **Which section of the Mines Act 1952 speaks about the Power of Inspectors when causes of danger not expressly provided against exist of when employment of persons is dangerous?**
(a) 9 (b) 22 (c) 23 (d) 24

9. **Which section of the Mines Act 1952 gives power to inspector to prohibit employment in mines?**
(a) 22A (b) 23 (c) 24 (d) 25

10. **At every below ground mine where more than 'A' Persons are ordinarily employed belowground and there is no rescue station within its radius of 35 Km, the Owner shall establish a rescue room near the mine entrance. 'A' is given by**
(a) 25 (b) 50 (c) 75 (d) 100

11. **The provisions of Mines Act, 1952 shall not apply (except few sections) to any mine or part where not more than 'n' persons are employed on any day in connection with the excavation. 'n' is given by**
(a) 5 (b) 10 (c) 20 (d) 40

12. **In respect of every medical examination under rule 29B, the Manager of the mine concerned shall give at least N days prior notice in writing to the persons to be examined. N is given by**
(a) 10 days (b) 15 days (c) 20 days (d) 30 days

13. **In which of the following cases Mines Act provision is not applicable?**
(a) depth of excavation is less than 15cm
(b) less than 20 persons are employed on one day
(c) depth of excavation is less than 15cm and at least 20 persons are employed on a day
(d) in all cases irrespective of manpower

14. **Who is not an official but a competent person?**
(a) overman or foreman (b) mining sirdar or mate
(c) shotfirer or blaster (d) under manager

15. **Who is duly appointed in writing by the Manager as competent person to supervise the operation, plant or equipment?**
(a) shotfirer or blaster (b) surveyor
(c) ventilation officer (d) safety officer

16. **Mine Rules comes into force on ?**
(a) 2nd March 1955 (b) 2nd July 1955
(c) 2nd May 1955 (d) 2nd January 1955

17. **According to CMR any place in the mine which has lawful access is called?**
(a) Face (b) Gallery (c) Working place (d) Working

18. **Any excavation made or being made in a mine for search of or obtaining coal is called?**
(a) Exploration (b) Working (c) Drilling (d) Boring

19. **In moving front of any working place or the in bye end of entry gallery is called?**
(a) Heading (b) Face (c) Seam (d) Goaf

20. **General body of air means the general atmosphere in a seam but not include general atmosphere in.....?**
(a) Roof cavities (b) The sealed off area
(c) In any bore hole drilled in coal (d) Both 2 and 3

21. **When a mine or seam has been abandoned or the working thereof has been discontinued over a period exceeding 60 days the owner or manager within .....of the abandonment or of expiry of the said period given to the Chief Inspector ?**
(a) 7 days (b) 15 days (c) 30 days (d) 40 days

22. **When it is intended to reopen a mine or seam after abandonment or after discontinuance for a period exceeding 60 days; the owner or manager not less than .....before resumption of mining operations give to the Chief Inspector?**
(a) 7 days (b) 15 days (c) 30 days (d) 40 days

23. **When a change occurs in the name or ownership of mine or the address of the owner; the owner or manager shall within.....from the date of change give to the Chief Inspector?**
(a) 7 days (b) 15 days (c) 30 days (d) 40 days

Hours of Work/Leave With Wages

24. **No adult shall work above ground in a mine for more than ....in any week?**
(a) 36 hours (b) 24 hours (c) 48 hours (d) 60 hours

25. The over time wages are ....of ordinary wage rate?
(a) equal (b) twice (c) thrice (d) half

26. No person shall be allowed to work in a mine who has already been working in any other mine within the preceding...?
(a) 6 hours (b) 9hours (c) 12 hours (d) 18 hours

27. Maximum maternity leave allowed is?
(a) 4 weeks (b) 6 weeks (c) 9 weeks (d) 12 weeks

28. Any person who has been allowed leave for not less than ...shall be paid wages due for the period of leave allowed before his leave begins?
(a) 3 days (b) 4 days (c) 6 days (d) 9 days

29. The maximum working hours in a day is?
(a) 6 hours (b) 8 hours (c) 9 hours (d) 12hours

30. The fine for obstructing inspector duties?
(a) ₹500 (b) ₹1000 (c) ₹200 (d) ₹2500

31. The fine for giving notice without best knowledge is?
(a) ₹500 (b) ₹1000 (c) ₹200 (d) ₹2500

32. The fine for running time without manager is?
(a) ₹500 (b) ₹1000 (c) ₹200 (d) ₹2500

33. The fine for contravences of any regulation or byelaws is?
(a) ₹500 (b) ₹1000 (c) ₹2000 (d) ₹2500

34. Child means a person who has not completed his?
(a) 16th year (b) 17th year (c) 18th year (d) 15th year

35. According to mines rules the interior walls of a latrine shall be white washed once in at least in every?
(a) 4 months (b) 3 months (c) 2 months (d) 1 month

36. No woman shall be employed in any mine above ground except between the hours of.....?
(a) 6 AM to 7 PM (b) 5 AM to 6 PM (c) 6 AM to 6 PM (d) 5 AM to 7 PM

37. Leave with wages are calculated in case of person employed below ground at the rate of one for every ..... days of work performed by him?
(a) 15 (b) 20 (c) 30 (d) 25

38. Leave with wages are calculated in case of person employed above ground at the rate of one for every ...days of work performed by him?
(a) 15 (b) 20 (c) 30 (d) 25

39. Additional workmen's inspector is required to be nominated to assist the workmen's inspector where the number of persons employed in a mine exceeds?
(a) 1000 (b) 1200 (c) 750 (d) 1500

40. In case of person employed below ground in a mine if he during the calender year put in not less than ....attendances at the mine is eligible for leave with wages?
(a) 190 (b) 240 (c) 150 (d) 300

41. The compensatory days of rest to be allowed in any week to any person is?
(a) 1 (b) 2 (c) 3 (d) 4

42. The penalty for giving fake fitness certificate is?
(a) ₹500 (b) ₹1000 (c) ₹100 (d) ₹200

43. Adult means a person who has completed?
(a) 16th year (b) 18th year (c) 20 year (d) 23 year

44. Where work of the seam is carried out by two or more sets of persons working during different periods of the day each such sets is called.....and each of such periods is called...?
(a) Relay ; Shift (b) Shift ; Relay (d) Shift ; work time (d) none

45. If any medical practitioner fails to send a report regarding any disease notified by him; he shall be punished with a maximum fine of....?
(a) ₹ 25 (b) ₹50 (c) ₹75 (d) ₹100

46. The periods of work of any adult shall be so arranged that ;along with his interval of rest they shall not in any day spread over more than....?
(a) 12 hours (b) 24 hours (c) 36 hours (d) 10 hours

47. No adult employed below ground in a mine shall be allowed to work for more than ....hours in any week or for more than ..hours in any day?
(a) 36 ; 6 (b) 48 ; 9 (c) 48 ; 8 (d) 50 ; 10

48. The person employed in a underground mine shall not work more than ....hours including overtime?
(a) 8 (b) 9 (c) 10 (d) 12

49. No person below.....years of age shall be allowed to work in any mine or part thereof?
(a) 16 (b) 18 (c) 20 (d) 23

50. Every woman employed in amine above ground shall be allowed an interval of not less than ...hours between termination of employment on any one day the commencement of the next period of employment?
(a) 8 (b) 10 (c) 11 (d) 12

51. A person whose service is commences; in the case of a person employed below ground he has to put in attendance for not less than ....of the total number of days during the remainder of the calendar year?
(a) 1/4 (b) 1/3 (c) 1/5 (d) 1/2

52. A person whose service is commences; in the case of a person employed above ground he has to put in attendance for not less than ....of the total number of days during the remainder of the calendar year?
(a) 1/4 (b) 1/3 (c) 2/3 (d) 1/2

53. The number of times in which leave may be taken during anyone calendar year shall not exceed?
(a) 3 (b) 4 (c) 5 (d) 6

54. If any owner fails to submit within ...a draft of bye laws after being called upon to do so by the Chief Inspector (C.I.); the C.I may propose a draft of such bye laws as appear to him?
(a) 1 month (b) 2 months (c) 3 months (d) 4 months

55. If a person employed in above ground he shall not work continuously for more than ....before he had an interval for rest of at least 1/2 an hour?
(a) 3 hours (b) 4 hours (c) 5 hours (d) 6 hours

56. A competent person means he is attained the age of?
(a) 18 years (b) 16 years (c) 20 years (d) 23 years

57. If a mine already been opened the plans shall be submitted within ...to Regional Inspector?
(a) 30 days (b) 60 days (c) 90 days (d) 1 year

58. If the boundary of mine is changed a plan showing the new boundary shall be submitted within.....to R.I?
(a) 7 days (b) 15 days (c) 30 days (d) 3 months

59. The owner or manager of shall submit to the C.I and the R.I correct returns respect of preceding month on or before the.....every month?
(a) 10th day (b) 4th day (c) 14th day (d) 24th day

60. The owner or manager shall submit annual reports to District Magistrate ar C.I on or before ....of every year?
(a) 20th May (b) 20th April (c) 20th March (d) 20th Februa

61. If a mine is abandoned or working thereof is discontinued over a perio exceeding 60 days if a change occurs in the owner of mine the annual return shall be submitted within.....days abandonment or change of ownership o within ....days of discontinuance?
(a) 30 ; 90 (b) 60 ; 90 (c) 30 ; 60 (d) 60 ; 120

62. When it is intended to abandon a mine or seam or to discontinue workin thereof for a period exceeding 60 days the owner or manager shall not less than .....before such abandonment or discontinuance; give to C.I and R.I?
(a) 15 days (b) 30 days (c) 40 days (d) 60 days

63. When the employment of person is terminated or such person leaves the employment the manager shall give notice within.....from the day of such termination?
(a) 7 days (b) 15 days (c) 30 days (d) 40 days

64. For every meeting of the board not less than ....prior notice intimating place and time of the meeting?
(a) 7 days (b) 10 days (c) 15 days (d) 30 days

65. No byelaw shall have effect until.....after the date on which it was sc published?
(a) 1 month (b) 2 months (c) 3 months (d) 4 months

66. Application for an examination conducted by the board shall be made to the board not less than.....prior to the fixed for the examination?
(a) 30 days (b) 60 days (c) 15 days (d) 7 days

67. No person shall be admitted as a candidate at any examination held by the board unless he is....of age?
(a) 20 years (b) 18 years (c) 16 years (d) 23 years

68. The fees for grant of first class manager's certificate is.....Rs?
(a) 100 (b) 75 (c) 50 (d) 25

69. The fees for grant of first class manager's duplicate certificate is.....Rs?
(a) 100 (b) 5 (c) 50 (d) 10

70. As per CMR the retirement age of a person employed in the mine is?
(a) 60 years (b) 62 years (c) 58 years (d) 55 years

71. Financial year of the mine means period of 12 months is..?
(a) 31 Dec to 31 Dec (b) 1st day April to 31st of March
(c) 1st day Jan to 31st Dec (d) None

72. No person shall act or be employed as manager unless he is at least..?
(a) 18 years (b) 20 years (c) 23 years (d) 25 years

73. No person shall act or be appointed as manager more than one mine except with the previous permission in writing of the C.I and the permission shall have effect for a period exceeding....?
(a) 6 months (b) 12 months (c) 18 months (d) 24 months

74. If the mine is producing 3000 te per month then the qualification of the manager is?
(a) First class Mine Manager's certificate of competency
(b) A first or second class Mine Manager's certificate of competency
(c) Manager's permit
(d) None

75. No manager shall vacate his office without giving due notice in writing to the owner or agent at least....before the day on which he wishes to vacate his office?
(a) 7 days (b) 10 days (c) 15 days (d) 30 days

76. On or before the .....every year the owner; agent or manager of mine shall exhibit on the notice board at the office of a mine information regarding leave with wages?
(a) 20th Feb (b) 1st Jan (c) 1st May (d) 20th May

77. The owner or manager shall provide suitable residential accommodation for the manager and u/m within a distance of....KM from all mine openings?
(a) 4 (b) 5 (c) 6 (d) 7

78. In every mine the average monthly output of which exceeds at least.....the manager shall be assisted in the work by safety officer?
(a) 5000 (b) 3000 (c) 7000 (d) 1000

79. In every mine the average monthly output of which exceeds at least.....the manager shall be assisted in the work by under manager?
(a) 5000 (b) 3000 (c) 7000 (d) 1000

80. If the mine monthly output is 18000 te then the number of assistant or under managers required is?
(a) 2 (b) 3 (c) 4 (d) 1

81. In every mine consisting of gassy seams of first degree the average monthly output exceeds .....the manager shall be assisted by ventilation officer?
(a) 5000 (b) 3000 (c) 7000 (d) 2500

82. In every mine daily supervision shall be exercised by the manager; in case of below ground he shall visit on at least....in every week?
(a) 4 days (b) 3 days (c) 5 days (d) 2 days

83. Where either of the two ways affording means of egress from the district to the surface is not ordinarily used for travelling once at least in every.....the whole of such way is examined by sirdar?
(a) 7 days (b) 10 days (c) 15 days (d) 30 days

84. When a machine is required to work on gradient exceeding .....an effective contrivance to prevent the machine running back shall be provided and used?
(a) 1 in 3 (b) 1 in 4 (c) 1 in 5 (d) 1 in 7

Wages & Allowances

85. Which of the following earnings is not included in the "ordinary rate of wages" of mine employees?
(a) basic wages (b) dearness allowance
(c) bonus excluding incentive for production (d) compensation in cash

86. Which of the following section of Mines Act & Mines Rule state the provision on disability allowance?
(a) 9 & 23 (b) 9A & 82A (c) 22 & 24 (d) 43 & 44

87. Which section of Mines Act & provisions of Mines Rule restricts the employment of persons for not more than 6 days in a week?
(a) 28 of Act & 47 of Rule (b) 32 of Act & 51 of Rule
(c) 34 of Act & 63 of Rule (d) 43 of Act & 79 of Rule

88. As per Mines Act 1952, the periods of work of any adult employee above ground shall not be more than "A" hours along with his interval for rest and he shall not work for more than "B" hrs continuously before he has an interval of rest for at minutes. A and B are given by
(a) 9 & 1 (b) 8 & 2 (c) 12 & 5 (d) 14 & 6

89. Which section of Mines Act gives exemption from the section regarding hours of employment above & below ground?
(a) 37 (b) 38 (c) 42 (d) 48

90. Which section of Mines Act 1952 prohibits the employment of women in underground mine?
(a) 45 (b) 46 (c) 47 (d) 48

91. Which section of Mines Act gives power to Central Government to exempt either absolutely or subject to any specified condition any local area of any mine for the operation of all or any provision of Act, Rules or Regulations?
(a) 83 (b) 85 (c) 87 (d) 88

92. As per 3rd schedule of Mine Rule, the number of first aid boxes to be provided in mines shall be @ of one for every 'A' Persons employed. A is given by
(a) 100 (b) 125 (c) 150 (d) 200

93. As per CMR 1987, competent person in relation to any work means a person who has attained the age of
(a) 18 yrs (b) 20 yrs (c) 21 yrs (d) 25 yrs

Health

94. Indication of fatigue is determine by
(a) lower initial recovery of pulse rate
(b) higher initial recovery of pulse rate
(c) fast return of heart towards resting level
(d) second and subsequent recovery pulse rate remains at normal level

95. Energy reserve of average man (25 year, 65 kg, 1.75m ht) is about
(a) 5 Kcal (b) 10 Kcal (c) 20 Kcal (d) 25 Kcal

96. If any work requires 6 Kcal of energy then according to Spitzer what should be percentage rest allowance in 1 hour?
(a) 25% (b) 50% (c) 75% (d) 100%

97. Step test protocol is adopted for physical fitness measurement -
(a) O_2 consumption (lit/min) (b) VO_{2max}
(c) heart rate (d) CO_2 in exhale air

98. "Fitting the task to human" is described by
(a) ergonomics (b) statistics
(c) psychology (d) information technology

99. Which of the following is inversely proportional to environmental temperature?
(a) barometric pressure (b) miners health
(c) design appliances (d) workload

100. The main focus of ergonomics is
(a) work (b) man (c) posture (d) information

101. Workers can carry out prolonged task without experiencing fatigue provided that energy demand of the task does not exceed
(a) 50W (b) 150W (c) 250W (d) 500W

102. Which of the following energy level is required when body is at cast
(a) 10W (b) 20W (c) 40W (d) 80W

103. Ergonomic work place design must satisfy one of the following criteria
(a) less stress on employees health (b) to enhance workers efficiency
(c) to improve job quality (d) to maximize production at high risk

104. Risk of heat stroke or heat collapse increases rapidly as deep body temperature rises above
(a) 300°C (b) 35°C (c) 37°C (d) 39°C

105. Amount of tolerable heat stress is determined by which of the following?
(a) protein (b) carbohydrate (c) BSA (d) Hymidity

106. Workers are not permitted to continue work when their deep body temperature exceeds
(a) 35°C (b) 38°C (c) 42°C (d) 48°C

107. Limit of continuous work (LCW) is denoted by
(a) resting HR + 35 beats (b) resting HR + 72 beats
(c) resting HR + 100 beats (d) recovery HR + 120 beats

108. **Total calories consumed by any individual is determined by**
(a) fair day workload
(b) maximum acrobic capacity
(c) basal + leisure + working calories
(d) calories required to keep an individual alive

Medical Examination

109. **Periodical medical examination is carried out for every?**
(a) 3 years (b) 5 years (c) 6 years (d) 4 years

110. **Every year ...of the persons employed at the mine undergo the medical examination every year?**
(a) 1/2 (b) 1/3rd (c) 1/4th (d) 1/5th

111. **The remuneration for the members of the committee shall be fixed by?**
(a) Central Govt. (b) State Govt.
(c) The mining company (d) None

112. **If a member of the committee intends to be absent from India for a period longer than ...he shall tender his resignation?**
(a) 3 months (b) 1 yr (c) 9 months (d) 6 months

113. **The secretary to the committee shall give at least....notice to every member of the commitee present in India?**
(a) 7 days (b) 14 days (c) 30 days (d) 45 days

114. **No business shall be transacted at a meeting of the committee unless atleast ...members including chairman are present?**
(a) 4 (b) 6 (c) 8 (d) 3

115. **The periodical medical examination is not apply for?**
(a) permanently employed
(b)Temporarily employed
(c) Casual basis for continuous period not exceeding 6 months
(d) both (b) and (c)

116. **The annual return shall be submitted to chief inspector by manager on or before.....of every year?**
(a) 20th Feb (b) 1st Jan (c) 1st May (d) 20th May

Workmen's Inspector

117. **Workman's inspector comes by?**
(a) Election (b) Deputation (c) Selection (d) Nomination

118. **What should be the minimum number of employment when the owner, agent or Manager shall remain bound to designate 3 suitably qualified employees of the mine as workmen's Inspectors of the mine concerned?**
(a) 300 (b) 500 (c) 700 (d) 1000

119. **Identify the department from which workmen's inspector is not considered?**
(a) Mining (b) Civil (c) Electrical (d) Mechanical

120. **What is the minimum no. of person employed therein a mine when Mining workmen's inspector shall be assisted by one additional inspector?**
(a) 500 (b) 1000 (c) 1500 (d) 2000

121. **A workmen's inspector shall hold office for a period of 'A' years from the date of his nomination. 'A' is given by**
(a) 1 yr (b) 2 yr (c) 3 yr (d) 4 yr

122. **What should be the minimum limit of experience for nominating a person as workmen's Inspector?**
(a) 3 yr (b) 5 yr (c) 7 yr (d) 12 yr

123. **How many days in a week the workmen's inspector is supposed to perform the duties as mentioned in rule 29 R?**
(a) 1 day (b) 2 day (c) 3 day (d) 4 day

124. **In which form the workmen's inspection shall record his report of inspection?**
(a) Form P (b) Form Q (c) Form M (d) Form U

125. **In case of any difference in opinion workmen's inspector & the owner, agent or manager, the matter should be sent to**
(a) Director (Technical / Operation) (b) CMD of the subsidiary
(c) Chief Inspector (d) Chairman of the company

126. **The number of workmen's inspector in a large u/g coal mine**
(a) 1 (b) 2 (c) 3 (d) 4

127. **The workman inspector shall be employed if the number of persons employed exceed ?**
(a) 500 (b) 1500 (c) 1000 (d) 100

128. If the number of persons are 3000 in the mine then the number of workmen inspectors are required is?
(a) 1 (b) 2 (c) 3 (d) 4

129. The term for the workmen inspector is?
(a) 5 yrs (b) 3 yrs (c) 2 yrs (d) 6 yrs

130. The owner; manager or agent shall take action on the report of workmen's inspector within a period of....from the date of entry into the register?
(a) 7 days (b) 30 days (c) 15 days (d) 10 days

131. The owner; agent or manager shall constitute a 'safety committee' for promoting safety in the mine for more than .....persons are ordinarly employed in every mine?
(a) 500 (b) 1000 (c) 50 **(d) 100**

132. The number of members are nominated in the safety committee is?
(a) 5 (b) 10 (c) 13 (d)15

133. The safety committee shall meet at least once in?
(a) 15 days (b) 7 days (c) 6 months (d) 30 days

134. The owner; agent or manager shall within a period of ...from the date of receipt of the recommendations of the safety committee shall indicate to the secretary to the safety committee; the action taken to implement the recommendations?
(a) 7 days (b) 30 days (c) 15 days (d) 10 days

135. At every mine employing more than ...persons on any day of the preceding calendar year there shall be provided suitable first aid room?
(a) 50 (b) 100 (c) 150 (d) 250

First Aid

136. Which of the following certificate is considered as a valid first aid certificate for any persons working therein a mine?
(a) Certificate from Medical Association of India?
(b) Certificate from local dispensary
(c) Certificate from area level hospital
(d) Certificate from St. Johns' Ambulance Association (India)

137. What should be the minimum number of person employing or any one-day require establishment of first aid room in a mine?
(a) 25 (b) 50 (c) 75 (d) more than 100

138. What is the minimum floor space required for a first aid room in a mine?
(a) 8 m^2 (b) 10 m^2 (c) 12 m^2 (d) 15 m^2

139. Where the number of persons employed in a mine is more than 'A' the charge of first aid room shall be a whole time employee. 'A' is given by
(a) less than 200 (b) less than 500
(c) less than 750 (d) more than 1000

140. Which of the following category of work persons are not bound statutorily t have first aid certificate & to carry first aid outfit while on duty?
(a) Over man (b) Mining Sirdar
(c) Line helper (d) Mechanic

141. The owner, agent or manager of a mine shall remain bound to appoint qualified welfare officer, where the number of worker is 'A' or more. 'A' i given by
(a) 250 (b) 500 (c) 750 (d) 1000

142. The first aid room shall have a floor space of not less than ...?
(a) 10 m^2 (b) 14 m^2 (c) 20 m^2 (d) 18 m^2

143. The first aid room shall be in charge of a qualified medical practitioner wher the number of persons ordinarily employed in a mine is more than?
(a) 500 (b) 1000 (c) 250 (d) 150

144. Every person who suffers an injury during the course of work shall report fc examination or treatment at the first aid room hospital or dispensary; as th case may be .....irrespective of first having been rendered at or near the plac of work?
(a) Before leaving the mine (b) Before entering into the mine
(c) after leaving the mine (d) None

145. The first aid station shall be provided at the top of every shaft; in evei workshop; at every other places; at every opencast workings where mo than ....persons are employed at any time?
(a) 50 (b) 25 (c) 100 (d) 150

146. The first aid stations shall be constructed such that the provision of a fir aid station within ....of another first aid station?
(a) 100 m (b) 200 m (c) 300 m (d) 400 m

147. A day of rest for any person shall mean a period(weekly day of rest) of at least....?
(a) 2 days (b) 24 consecutive hours
(c) 24 non consecutive hours (d) 36 hours

148. No apprentice or trainee of the age of ....years shall be employed in a mine except under immediate supervision of a competent person?
(a) 20 to 23 years (b) 18 to 20 years (c) 16 to 18 years (d) above 23 years

Safety Committee

149. What is the minimum no. of persons to be employed when the owner, agent or manager shall constitute a safety committee for promoting safety in the mine?
(a) 100 (b) 200 (c) 300 (d) 500

150. Who acts as secretary to the safety committee constituted as per rule 29T?
(a) Manager (b) Safety Officer
(c) Ventilation Officer (d) Sampling In-charge

151. How many officials or competent persons of mine the chairman as per rule 29 U shall nominate?
(a) 2 (b) 3 (c) 4 (d) 5

152. One of the function of the safety committee is to meet at least once in 'A' days to consider the matter placed before the committee. 'A' is given by
(a) 7 days (b) 15 days (c) 30 days (d) 60 days

153. The owner, agent or manager shall apprise the secretary of the safety committee of the action taken on the recommendation of the committee. What is the minimum time period of such reply?
(a) 7 days (b) 60 days (c)30 days (d) 15 days

Shelter/Sanitation/Drinking Water

154. As per Mine Rules 1955 every shelter shall have a floor area of not less than
(a) 10 Sq. m (b) 12 Sq. m (c) 14 Sq. m (d) 16 Sq. m

155. The quantity of drinking water to be provided in a mine or any part thereof shall be on a scale of at least.....for every person employed at any one time?
(a) 1 lit (b) 2 lit (c) 3 lit (d) 4 lit

156. The drinking water shall be cooled mechanically or other means if the persons employed in the mine above or below is more than .....?
(a) 50 (b) 100 (c) 150 (d) 250

157. The vessels where water is stored if the water is not supplied by taps; shall be cleaned once in?
(a) every day (b) 2 days (c) 5 days (d) 6 days

158. If the source of drinking water is not from a public water supply system; an inspector may by order in writing require the owner; agent or manager of the mine to submit a certificate from a competent health authority or analyst as to fitness of the water for human consumption within...?
(a) 7 days (b) 15 days (c) 3 days (d) at least possible delay

159. The drinking water points shall not be situated within ....of any washing place; urinal or latrine?
(a) 6 m (b) 15m (c) 10m (d) 12 m

160. The quantity of drinking water per person employed in a mine where W.B.T temperature exceeds 30 deg c is?
(a) 2 lit (b) 3 lit (c) 4 lit (d) 5 lit

161. The scale of latrine accommodation shall be at least one seat for every.....males or females employed in every mine?
(a) 25 (b) 50 (c) 100 (d) 150

162. If the number of males employed in the mine is 253 then the number of latrines required is?
(a) 4 (b) 5 (c) 6 (d) 7

163. If the number of persons employed in the mine is 500 then the quantity of water required is?
(a) 1000 lit (b) 500 lit (c) 250 lit (d) 1500 lit

164. The latrine shall be cemented up to the height of?
(a) 0.75 m (b) 1.25 m (c) 1.5 m (d) 0.5 m

165. Every latrine shall be white washed once at least in every ...?
(a) 3 months (b) 6 months (c) 4 months (d) 12 months

166. If any mine more than....persons employed in underground at any one time latrines shall be provided underground?
(a) 25 (b) 50 (c) 75 (d) 100

167. What should be the minimum floor area of a shelter in a mine?
(a) 10 m^2 (b) 12 m^2 (c) 14 m^2 (d) 20 m^2

168. At any mine, wherein more than 'A' persons are employed, the chief instructor shall give order to provide and maintain a canteen for use of all persons employed. 'A' is given by
(a) 250 (b) 350 (c) 500 (d) 750

169. The term of the committee member is.....years?
(a) 5 (b) 4 (c) 3 (d) 2

170. The term of the office of the elected member of the canteen is .....years?
(a) 5 (b) 4 (c) 3 (d) 2

171. What is the minimum stipulated quantity of drinking water to be provided in a mine or any part for every person employed at any one time?
(a) 1 Lit (b) 2 Lit (c) 2.5 Lit (d) 3 Lit

172. When does the inspector give an order in writing to supply cool water to the employee of opencast workings?
(a) where 100 or more persons are employed
(b) when there is huge sun shine
(c) when the employees do want
(d) when the manager does want

173. What is the scale of accommodation of latrine for males in mines?
(a) one seat for every 50 persons employed
(b) two seat for every 50 persons employed
(c) one seat for every 100 persons employed
(d) five seat for every 100 persons employed

174. What is the scale of accommodation of latrine for females in mines?
(a) one seat for every 25 persons employed
(b) one seat for every 50 persons employed
(c) one seat for every 75 persons employed
(d) one seat for every 100 persons employed

175. What should be the minimum no. of persons working therein a mine at one time shall require the provision of latrines?
(a) 25 (b) 50 (c) 75 (d) 100 or more

176. Which of the following activities do not fall under obligation of work person for the purpose of sanitation in a mine?
(a) no person shall intentionally damage or mines the latrines
(b) no person shall pollute the underground workings of a mine with excreta
(c) all person employed inside the ground shall acquaint themselves with th arrangements provides in the section of the mine
(d) all of the above

177. At every mine where more than ...persons are ordinarily employed; ther shall be provided adequate and suitable shelters at or near loading?
(a) 50 (b) 25 (c) 75 (d) 100

178. In opencast workings; workshops and mine entrances where ...persons ar ordinarily employed for taking food and rest; shelters shall be provided?
(a) 50 (b) 25 (c) 75 (d) 100

179. The floor area of the shelter should not less than?
(a) 10 m^2 (b) 14 m^2 (c) 20 m^2 (d) 18 m^2

180. The height of the shelter should not less than?
(a) 1.25 m (b) 1.5 m (c) 2 m (d) 2.5 m

181 At every mine where more than.....persons are ordinarily employed; canteen should be maintained?
(a) 100 (b) 150 (c) 200 (d) 250

182. Every canteen shall be situated not less than ....from any latrine; urinal; boile house; engine room etc?
(a) 5 m (b) 10 m (c) 15 m (d) 20 m

183. Inside the rooms and passages of the canteens should be white washed a least once in...?
(a) 6 months (b) 3 months (c) 1 yr (d) 2 yr

184. Canteens should be painted at least once in...?
(a) 6 months (b) 3 yrs (c) 1 yr (d) 2 yrs

185. The member of elected members of the canteen managing committee sha be on a scale of one for every ...persons employed?
(a) 1000 (b) 500 (c) 2000 (d) 1500

186. An underground coal mine panel produces 520 tonnes per day deploying 220, 200 and 192 persons in three shifts. As per CMR 1957, the minimum quantity of air in m^3/min to be delivered at the last ventilation connection of the panel is _____

187. For every mine wherein .... or more persons are ordinarily employed the owner; agent or manager shall appoint a Welfare officer?
(a) 500 (b) 1000 (c) 150 (d) 200

188. If the number of persons employed in a mine is 5000 then the number of welfare officer appointed in the mine is?
(a) 2 (b) 3 (c) 4 (d)5

189. A written notice of every appointment; authorisation; discharge; dismissal; resignation every welfare officer and of the date thereof shall be sent by manager to the C.I within ....from the date of such appointment?
(a) 15 days (b) 7 days (c) 30 days (d) 45 days

Medical Examination

190. What percentage of employees should undergo initial medical examinations every year of a mine?
(a) 10% (b) 20% (c) 30% (d) 40%

191. The initial medical examination of every person employed in the mine should be arranged within a period of 'A' years of the date so notified by the Manager. A is given by
(a) 2 (b) 3 (c) 4 (d) 5

192. In respect of every medical examination, the manager of the mine concerned shall give at least 'A' days of prior notice in writing to the person to be examined. A is given by
(a) 7 days (b) 14 days (c) 20 days (d) 30 days

192. In which form the Manager of the mine concerned shall give notice to the persons to be examined?
(a) Form I (b) Form II (c) Form D (d) Form M

193. In which form the standards of the initial medical examination of all people seeking employment are laid down?
(a) Form P (b) Form P-I (c) Form O (d) Form O-I

194. A person may appeal to the Manager for his re-examination even though the person has been declared medically unfit for the employment in mines. Which board will re-examine him?
(a) safety promotion board (b) medical council
(c) appellate medical board (d) board of scrutinizers

195. Who is supposed to be the convener of the Appellate Medical Board?
(a) Qualified medical officer of DGMS
(b) Qualified medical officer nominated by CI in consultation with Welfare organization
(c) Qualified medical officer in allopathic system of medicine employed in a state of Central Govt. of Govt. undertaking
(d) Any medical officer nominated by General Manager of the area

196. In which form the standards of the medical re-examination by the Appellate medical Board are laid down?
(a) Form P (b) Form Q (c) Form R (d) Form S

197. A medical practitioner making an examination shall be paid a fee not exceeding rupees....for each clinical examination?
(a) 12 (b) 16 (c) 20 (d) 25

198. The disability allowance payable shall be at the rate of .....of the monthly wages?
(a) 25 % (b) 40 % (c) 50 % (d) 60 %

NOTICES

199. In which form the notice regarding the hours of work is mentioned?
(a) Form A (b) Form B (c) Form C (d) Form D

200. In which form the date of termination of any employee is registered?
(a) Form B (b) Form P (c) Form C (d) Form D

201. In which form does the owner, agent or manager keep the record of leave with wages of employee?
(a) Forms B & C (b) Forms C & D (c) Forms D & C (d) Forms G & H

202. In which form the notice of opening required by section 16 of the Mines Act shall have to be submitted?
(a) Form B (b) Form C (c) Form I (d) Form II

203. In which form the Owner, Agent of Manager of a mine shall submit monthly return to the Chief Inspector?
(a) Form D (b) Form E (c) Form II (d) IA

204. In which form the Owner, Agent or Manager of a mine shall submit annual returns to the District Magistrate & Chief Inspector?
(a) Form K (b) Form M (c) Form IIA (d) III

205. How many days in advance, the Owner, Agent or Manager shall give notice to the Chief Inspector, when they intend to abandon or discontinue work of a mine?
(a) 30 days (b) 40 days (c) 60 days (d) 90 days

206. When is it intended to re-open a mine or seam after abandonment or discontinuance for a period exceeding 60 days, the owner, agent or manager shall not less than 'A' days before resumption of mining operation give notice to the Chief Inspector. 'A' is given by
(a) 30 days (b) 45 days (c) 60 days (d) 120 days

207. Notice of accident causing loss of life or serious bodily injury in connection with mining operations shall be given in Form IV-A to the District Magistrate, Chief Inspector & Regional Inspector within 'A' hours every such occurrence. 'A' is given by,
(a) 1 hr (b) 6 hr (c) 12 hr (d) 24 hr

RETURNS & REGISTERS

208. When do the manager submit annual return if a mine is abandoned?
(a) within 15 days of such abandonment
(b) within 30 days of such abandonment
(c) within 45 days of such abandonment
(d) None of the above

209. When do the manager submit annual return if working thereof is discontinued over a period of exceeding sixty days?
(a) within 45 days of such discontinuance
(b) within 60 days of such discontinuance
(c) within 90 days of such discontinuance
(d) None of the above

210. Notice of commencement and end of work is maintained in the?
(a) FORM A (b) FORM B (c) FORM C (d) FORM D

211. Register of employees; termination of employment; notice of work is maintained in the?
(a) FORM A (b) FORM B (c) FORM C (d) FORM D

212. Register of persons employed in ocp is maintained in ?
(a) FORM A (b) FORM B (c) FORM C (d) FORM D

213. Register of persons employed in underground is maintained in ?
(a) FORM A (b) FORM B (c) FORM C (d) FORM D

214. Register of persons employed above ground other than ocp is maintained in?
(a) FORM C (b) FORM D (c) FORM E (d) FORM F

215. Register of overtime wages is maintained in the form of?
(a) FORM F (b) FORM G (c) FORM H (d) FORM I

216. Register of leave wages during year is maintained in the form of?
(a) FORM F (b) FORM G (c) FORM H (d) FORM I

217. Register of compensatory days of rest is maintained in the form of?
(a) FORM F (b) FORM G (c) FORM H (d) FORM I

218. Registe of leave account during the year is maintained in the form of?
(a) FORM F (b) FORM G (c) FORM H (d) FORM I

219. Register of information regarding leave with wages is maintained in the form of?
(a) FORM J (b) FORM K (c) FORM L (d) FORM M,3

220. Register of return of reportable accidents is maintained in the form of?
(a) FORM J (b) FORM K (c) FORM L (d) FORM M

221. Register of return of reportable accounts and minor accidents is maintained in the form of?
(a) FORM J (b) FORM K (c) FORM L (d) FORM M

222. Register of Notice of initial/periodical medical examination is maintained in the form of?
(a) FORM J (b) FORM K (c) FORM L (d) FORM M

223. Register of second and final notice of initial periodical medical examination is maintained in the form of?
(a) FORM N (b) FORM O (c) FORM P (D) FORM P-I

224. Register of medical standard of fitness of persons employed is maintained in the form of?
(a) FORM N (b) FORM O (c) FORM P (d) FORM P-I

225. Register of report of medical examination is maintained in the form of?
(a) FORM N (b) FORM O (c) FORM P (d) FORM P-I

226. Register of annual return for the year is maintained in the form of?
(a) FORM Q (b) FORM R (c) FORM S (d) FORM T

227. Register of report of medical re-examination is maintained in the form of?
(a) FORM Q (b) FORM R (c) FORM S (d) FORM T

228. Register of second and final notice of medical by medical board is maintained in the form of?
(a) FORM Q (b) FORM R (c) FORM S (d) FORM T

229. Register of notice of medical re-examination by medical board is maintained in the form of?
(a) FORM Q (b) FORM R (c) FORM S (d) FORM T

230. Record maintained by workmen's inspector is maintained in the form of?
(a) FORM G (b) FORM R (c) FORM T (d) FORM U

231. The information regarding equipment of first aid room is maintained in?
(a) first schedule (b) second schedule
(c) third schedule (d) forth schedule

232. Abstracts of the mines act is in?
(a) second schedule (b) third schedule
(c) forth schedule (d) fifth schedule

233. Notice of opening is given in the form..?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV

234. Monthly returns shall be maintained in the form..?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV

235. Notice reopening of the mine is given in the form..?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV

236. Notice of accident is given in the form ...?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV A

237. Annual returns shall be in the form of....?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV

238. Perticulars of injured person in the form of..?
(a) FORM I (b) FORM II (c) FORM IV A (d) FORM IV B

239. Notice of disease notified in the form of..?
(a) FORM I (b) FORM II (c) FORM IV (d) FORM V

240. Particulars of injured person returning to duty is given in the form of...?
(a) FORM IV A (b) FORM II (c) FORM IV B (d) FORM IV C

241. The forms for systematic support rules in the.?
(a) First schedule (b) Second schedule (c) Thrid schedule (d) None

242. Extraction of coal by a system other than Bord and Piller system is the form of..?
(a) FORM I (b) FORM II (c) FORM III (d) FORM IV

Plans & Section

243. The surveyor shall record the full facts when workings of the mine have approached to about.....from the mine boundary or from disused or waterlogged workings?
(a) 60 m (b) 75 m (c) 90 m (d) 30 m

244. Every plan shall show a scale of the plan at least .....long?
(a) 15 cm (b) 20 cm (c) 25 cm (d) 30 cm

245. Every plan in the mine unless otherwise provided be on a scale having R.F of?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (d) 1500:1

246. The minimum R.F for the OCP mine planes is?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (c) 1500:1

247. An undergournd plan showing every important surface feature within the boundaries such as railway etc which is within .....of any part of the workings measured on the horizontal plane?
(a) 50 m (b) 100 m (c) 150 m (d) 200 m

248. An u/g plan where a seam has an average inclination of more than .....from the horizontal;vertical section of mine shall be shown?
(a) 15 deg (b) 30 deg (c) 45 deg (d) 60 deg

249. The R.F of ventilation plan is?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (d) 1500:1

250. The R.F of geological plan is?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (d) 5000:1

251. Combined plans shall be maintained of all seams which are lying within .....of each other and workings in different seams or sections shall be shown in different colurs?
(a) 3 m (b) 6 m (c) 9 m (d) 12 m

252. The plans maintained shall show surface contours lines drawn at vertical intervals not exceeding.....?
(a) 5 m (b) 3 m (c) 8 m (d) 10 m

253. The spot levels in the plans shall at points not more than ....apart?
(a) 100 m (b) 150 m (c) 200 m (d) 300 m

254. Where it is not possible to show the complete boundary of leasehold on the same plan; an additional 'KEY PLAN' having scale ....shall be shown?
(a) 2400 :1 (b) 5000 :1 (c) 25000 :1 (d) 50000:1

255. The plans required to show all features both above and below ground of all adjacent mines as are situated within.....?
(a) 30 m (b) 60 m (c) 75 m (d) 100 m

256. The R.F of the dust plan is?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (d) 1500:1

257. The R.F of the water danger plan is?
(a) 2000:1 (b) 1200:1 (c) 2400:1 (d) 1500:1

258. The warning line shall be shown in the plan within a distance of .....of any body of water?
(a) 60 m (b) 90 m (c) 120 m (d) 150 m

259. The statutory restriction line shall be shown in the plan within a distance of .....of any body of water?
(a) 60 m (b) 90 m (c) 120 m (d) 150 m

260. When the geological maps of the area or any investigation of local knowledg indicates the existence of unconsolidated surface deposits with the boundai of a mine or within....?
(a) 60 m (b) 90 m (c) 120 m (d) 150 m

261. The owner or manager shall submit to the C.I two upto date copies of th plans on or before.....every year?
(a) 14th March (b) 20th February (c) 31st October (d) 2nd July

Shafts/Inclines

262. A person appointed to superintend the lowering and raising of persons tool and materials and to transmit signals at the top of a shaft or incline is called
(a) Banksman (b) On setter (c) Trammer (d)In-setter

263. According to CMR the landing or platform in a shaft and includes an excavatio there from between the top and the bottom of the shaft is called?
(a) Inset (b) Scaffold (c) Collar (d) None

264. Why outlets from a mine are not provided closer than 13.5 m?
(a) for quicker intercommunication
(b) for easier pit top arrangement
(c) closer outlets will weaken the shaft pillar causing possibility of leakage
(d) three may be possibility of subsidence

265. Distance between two shafts, inclines or outlets shall not be less tha .....meters from one another at any point, and each shall be connecte with the other by means of a walkable passage.
(a) 13.5m (b) 14 m. (c) 10.5 m (d) None of the abov

266. In every shaft exceeding 100 m. in depth, there shall be provided an effectiv automatic contrivance to prevent ..... hereinafter called th 'Automatic Contrivance". The Automatic Contrivance shall prevent th descending cage from 46 being landing at the pit bottom or other permaner landing at a speed exceeding 1.5 m. per second and shall also control th movement of the ascending cage in such a manner as to prevent danger t persons riding therein. The Regional Inspector may, by an order in writin specify the maximum speed of winding in any shaft.
(a) over speeding and over winding (b) breaking of the rope
(c) jamming of the rope (d) None of the above

267. **At the top of every shaft or winze where cages are used suitable keps are provided. This provision is not applicable only when**
(a) more than 10 persons are in the cage (b) speed is 1 m per second
(c) there is koepe system of winding (d) depth of shaft is less

268. **Number of persons to be allowed to ride in the same cage or same beck of a cage at one time shall be fixed by**
(a) Safety officer of the mine (b) Mine manager
(c) Mine foreman (d) Director of Mines Safety

269. **As per MMR 1961, CI has permitted that the total of authorized number of persons ride at any one time in any cage shall exceed 'A' percent of the maximum load when materials are wound. A is given by**
(a) 20% (b) 40% (c) 60% (d) 80%

270. **As per MMR 1961, no winding rope shall be used in a shaft exceeding 1500 m in depth if its safety factor is less than**
(a) 2 (b) 3 (c) 4 (d) 5

271. **Identity of wrong statement from the below stated statutory remarks**
(a) the top of every opencast working shall be kept fenced
(b) fencing shall be erected if excavation operation extends within a distance of 30 m of public road or building
(c) fencing to be done around the subsided area in mines
(d) every entrance to a shaft, winze, chute or other dangerous place shall have efficient fencing

272. **In any shaft, ladder or strong construction may be used as a means of ingress or egress of persons employed in a mine. What should be the maximum inclination of such ladder from the horizontal?**
(a) 30° (b) 40° (c) 80° (d) 90°

273. **What is the minimum distance stipulated between two shafts, inclines or outlets of a mine?**
(a) 5.5 m (b) 13.5 m (c) 19.5 m (d) 30 m

274. **The diameter of the drum of any winding engine installed after Oct 25, 1955 shall be not less than 'A' times of the diameter of the rope. 'A' is given by,**
(a) 60 (b) 80 (c) 100 (d) 120

275. **What shall be the distance between the detaching hook & the detaching plate when the cage is at its normal position at the top of the shaft?**
(a) 1 m (b) 1.4 m (c) 1.8 m (d) 2.2 m

276. **What is the name f the device used in a shaft exceeding 100 m depth to prevent over speeding & over winding?**
(a) automatic speed indicator— (b) automatic contrivance
(c) automatic depth indicator (d) none of the above

277. **What should be the distance up to which the guides shall be kept extended towards the bottom of the sinking shaft exceeding 130 m in depth?**
(a) 13.5 m (b) 16.5 m (c) 19.5 m (d) 22.5 m

278. **Where the shaft exceeds 45 m in depth, the person working at the bottom of the shaft shall be protected by a covering which shall be kept lowered within 'A' meters of the bottom of the shaft. 'A' is given by,**
(a) 22.5 m (b) 32.5 m (c) 42.5 m (d) 52.5 m

279. **Identify one of the following conditions which does attract the provision of prohibiting the use of any rope for winging**
(a) any doubt regarding fitness of the rope
(b) rope which has been spliced
(c) the breaking load of the rope at any point is not less than 10 times the maximum static load
(d) none of the above

280. **What should be the minimum depth of a sinking shaft for which winding rope made of cold drawn steel wire is recommended to use?**
(a) 40 m (b) 60 m (c) 80 m (d) 100 m

281. **Where the shaft is more than .....in depth the arrangements for persons to descend and ascend is by mechanical means?**
(a) 30 m (b) 60 m (c) 75 m (d) 100 m

282. **Every ladder in the shaft shall be securely fixed in the shaft at an inclination of nor more than .....from the horizontal?**
(a) 60 deg (b) 70 deg (c) 80 deg (d) 45 deg

283. **Shafts and outlets shall not be less than .....distant from one another at any point?**
(a) 12.5 m (b) 13.5 m (c) 14.5 m (d) 16 m

284. **Every shaft in the course of being sunk shall be provided with a permanent lining of metal ;concrete which shall at no time be more than ...form the bottom of the shaft?**
(a) 20 m (b) 5 m (c) 6 m (d) 10 m

285. Every shaft in the course of being sunk shall be provided with a permanent lining of steel rings which shall at no time be more than ...form the bottom of the shaft?
(a) 20 m (b) 5 m (c) 6 m (d) 10 m

286. Every shaft or incline shall be examined once at least in every.....?
(a) 7 days (b) 14 days (c) 1 month (d) 3 months

287. When it is intended to bring into use any new winding installation for lowering and raising persons; the owner or manager shall not less than ....before such use give notice to R.I?
(a) 30 days (b) 60 days (c) 100 days (d) 120 days

288. There shall be at least .....turns of the rope on the drum when the cage or other means of conveyance is at its lowest working point in the shaft?
(a) 2 (b) 3 (c) 4 (d) 5

289. In signaling the code for raise the cage is ?
(a) 1 rap (b) 2 raps (c) 3 raps (d) 4 raps

290. The gap both vertical and horizontal between the protective roofing and the top of cage; when the cage is at the bottom of the shaft; shall not exceed....?
(a) 15 cm (b) 30 cm (c) 10 cm (d) 40 cm

291. Where winding depth is at least more than .....two independent means of transmitting signals should be provided?
(a) 60 m (b) 100 m (c) 150 m (d) 250 m

292. In shafts more than .....in depth over wind switch shall be provided?
(a) 60 m (b) 100 m (c) 150 m (d) 250 m

293. The space between detaching hook and the detaching bell when the cage or other means of conveyance is at its normal position at the top of the shaft; shall not less than .... where geared engine used.....where direct engine used?
(a) 1.8 m & 3.6 m (b) 2.5 m & 5 m (c) 3 m & 6 m (d) None

294. The descending cage from being landed at the pit bottom or other permanent landing at a speed exceeding....m/sec?
(a) 1 (b) 1.5 (c) 2 (d) 3

295. If the monthly output of the mine is 35000 te then the number of surveyors required is?
(a) 2 (b) 3 (c) 4 (d) 5

296. Test of automatic contrivance and every brake shall be examined once at least in every .....by raising each cage to pass the last control point above the top most landing?
(a) 7 days (b) 14 days (c) 30 days (d) 2 months

297. The floor of the cage of other means of conveyance and the lowest part of the gate or fence does not exceed .....and that between any two members of the gate does not exceed .....?
(a) 25 cm ;15 cm (b) 15 cm ; 25 cm (c) 30 cm ; 10 cm (d)10 cm ;30 cm

298. The number of the persons fixed in the shaft shall be such as to allow approximately .....m^2 of floor area per person?
(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.5

299. In a second outlets having depth over .....suitable cage shall be provided for ascending and descending of persons?
(a) 50 m (b) 20 m (c) 40 m (d) 70 m

300. If the depth of the shaft is 500 m then the maximum speed of the cage in man winding is....m/sec?
(a) 10 (b) 8 (c) 7 (d) 5.5

301. If the depth of the shaft is 1000 m then the maximum speed of the cage in man winding is....m/sec?
(a) 10 (b) 8 (c) 7 (d) 5.5

302. The maximum speed of the rope in man winding in case of depth of the shaft is?
(a) 12 m/s (b) 15 m/s (c) 10 m/s (d)20 m/s

303. If the depth of the shaft is 400 m then the maximum speed of the cage in shaft sinking is....m/sec?
(a) 1.5 (b) 2.5 (c) 3 (d) 3.5

304. If the shaft exceeds ..... in depth; there shall be provided for each bucket or other means of conveyance a detaching hook?
(a) 30 m (b) 45 m (c) 60 m (d) 100 m

305. The guides may not require in sinking shaft if the depth is less than at least....?
(A) 100 m (b) 200 m (c) 300 m (d) 150 m

306. The life of the winding rope is .....years?
(a) 2 (b) 3.5 (c) 5 (d) 6

307. The length of the tapered portion of the socket if white metal not used ;shall be not less than at least.....times the diameter of the rope?
(a) 12 (b) 24 (c) 30 (d)8

308. The length of the tapered portion of the socket if white metal is used ;shall be not less than at least.....times the diameter of the rope?
(a) 12 (b) 24 (c) 30 (d) 8

309. If white metal is used in the capping of ropes its melting point shall not exceed ....deg C and its temperature when poured into the socket shall not exceed ....deg Celcius?
(a) 300 ; 363 (b) 200 ;263 (c) 150 ;300 (d) 200 ; 400

310. If white metal is used in the capping of ropes the socket shall be heated to a temperature of about.....deg C before the white metal is poured in it?
(a) 50 (b) 100 (c) 200 (d) 300

311. Except in koepe winding the recapping of ropes shall be done once at least in every.....?
(a) 3 months (b) 6 months (c) 9 months (d) 12 months

312. Every detaching bell used in connection with a safety hook shall be examined once in every.....?
(a) 30 days (b) 3 months (c) 6 months (d) 12 months

313. The life of the cage suspension gear is generally restricted to ?
(a) 6 years (b) 10 years (c) 7 years (d) 5 years

314. Every passer bye so provided shall be not less than at least.....high?
(a) 1.2m (b) 1.5m (c) 1.8m (d) 2.5m

ROPES/HAULAGE

315. No rope which has been spliced shall be used for..... purposes.
(a) Winding (b) Rope haulage
(c) Winding while shaft sinking (d) None of the above

316. Unless exemption in writing has been granted by the Chief Inspector and subject to such conditions as he may specify therein, no rope the braking load of which at any one point therein is less than .....maximum static load on it when the cage or other means of conveyance attached to the end of the rope is at the lowest working point, shall be used or continued in use.
(a) 10 times the maximum static load (b) 8 times the maximum static load
(c) 6 times the maximum static load

317. In those forms of capping, in which the wires at the end of the rope are bent back on the rope itself to form a cone, wedges formed by the lapping of soft iron wire shall be placed between the rope and that portion which is bent back. The length of the tapered portion of the socket shall be not less than ..... the diameter of the rope.
(a) 12 times (b) 15 times (c) 20 times (d) None of the above

318. Where white metal is used in the capping of ropes, the tapered portion of the socket shall not be less than .....times the diameter of the rope.
(a) 8 times (b) 7 times (c) 6 times (d) 5 times

319. It shall be the duty of the engineer or other competent person to examine – Once at least in ..... hours –
(i) the attachment of the winding rope to the drum, the depth indicator, every part of the suspension gear in the shaft, including cages or other means of conveyance and their gates, and every external part of the winding apparatus, upon the proper working of which the safety of persons depends; an
(ii) the brakes of the winding engines;
(a) every shift (b) 12 hours (c)every 24 hours (d) None

320. It shall be the duty of the engineer or other competent person to examine – Once at least in every ..... –
(i) each winding rope, by passing the rope at a speed not exceeding one meter per second; and
(ii) the external parts of the winding engine, the guides and the signalling arrangements fitted in a shaft;
(a) every shift (b) every seven days (c) every month (d) None

321. Manholes shall be not less than 1.8 metres in height and 1.2 metres in depth, and not less than 0.75 metres but not more than one metre in width: Provided that where the roadway is less than 1.8 metres in height, the manholes may be made to the .....
(a) full height of the roadway (b) height of the coal seam
(c) 2.0 m (d) None

322. Every such travelling roadway shall –
(a) be not less than 1.8 m. high throughout;
(b) where the inclination exceeds 30 degrees from the horizontal, be provided with suitable steps or ladders -
TRUE/FALSE

323. No locomotive shall be used where the gradient of the track exceeds.
(a) I in 15 (b) I in 10 (c) 1 in 8 (d) None

324. Where white metal is used for capping of ropes, the tapered position of the socket shall not be less than 'A' times of the diameter of the rope. A is given by
(a) 4 (b) 6 (c) 8 (d) 10

325. What should be the maximum temperature of the white metal pouring into the socket for the purpose of capping?
(a) 300° C (b) 363° C (c) 415° C (d) 525° C

326. What temperature of the socket is suitable for pouring white metal into it?
(a) 100° C (b) 150° C (c) 200° C (d) 300° C

327. What should be interval of recapping of ropes other than the rope of Koepe system of winding?
(a) once in every month (b) once in every three months
(c) once in every six months (d) once in every twelve months

328. What is the maximum period of service expected from all parts of suspension gear?
(a) 4 yrs (b) 6 yrs (c) 8 yrs (d) 10 yrs

329. It shall be the duty of the Engineer or other competent person to examine every winding rope at least in 30 days by passing the rope at a speed not exceeding 'A' m/sec. A is given by
(a) 0.5 m (b) 1 m (c) 1.5 m (d) 2 m

330. What is the least number of stop-block to be installed at the top of every inclined plane to arrest tubs from running out of control?
(a) 1 (b) 2 (c) 3 (d) 4

331. What should be the maximum stipulated between runaway switch and stop block?
(a) length of train of tubs + 2 m (b) length of train of tubs + 4 m
(c) length of train of tubs + 6 m (d) length of train of tubs + 10 m

332. Which of the following attachment is used behind the set of ascending tubs?
(a) back stay (b) stop block
(c) drop war wick (d) safety catches

333. The diameter of winding drum shall not be less than 'A' times the diameter of rope. 'A' is given by
(a) 10 (b) 25 (c) 50 (d) 100

334. Efficient telephonic communication in any below ground coal mine should be provided when a system of haulage roadways & conveyors extends to a distance of more than 'A' meters. 'A' is given by
(a) 100 m (b) 200 m (c) 400 m (d) 600 m

335. What should be the maximum gradient while tubs standing on the track shall be effectively held by brakes or securely coupled to the haulage rope?
(a) 1 in 20 (b) 1 in 30 (c) 1 in 40 (d) 1 in 50

336. What is the minimum interval of recapping a haulage rope, which is once capped?
(a) 3 months (b) 6 months (c) 12 months (d) 24 months

337. What is the maximum gradient where locomotives cannot be used?
(a) 1 in 5 (b) 1 in 10 (c) 1 in 12 (d) 1 in 15

338. What should be the maximum gradient of all roads for trucks, dumpers or other mobile machinery?
(a) 1 in 4 (b) 1 in 8 (c) 1 in 10 (d) 1 in 14

339. No locomotive shall be used where the gradient of the track exceed
(a) 1 in 6 (b) 1 in 8 (c) 1 in 12 (d)1 in 15

340. Where haulage is effected by one or more ropes at least one runaway switch or other effective contrivance below the first stop block at a distance greater than the length of.....?
(a) 3 tubs (b) 4 tubs (c) 5 tubs (d) set of tubs

341. The distance between the runaway switch and stop block shall not exceed the length of set or train of tubs more than .....?
(a) 10 m (b) 5 m (c) 15 m (d) 20 m

342. Tub re-railers are provided at intervals of not more than at least.....?
(a) 150 m (b) 200 m (c) 250 m (d) 300 m

343. On every haulage roadway exceeding .....in length ;effective means of transmitting signals shall be provided?
(a) 30 m (b) 50 m (c) 100 m (d) 60 m

344. Where in any mine below ground a system of haulage roadways extends to a distance of more than ....from the shaft efficient telephonic communication shall be provided?
(a) 30 m (b) 100 m (c) 400 m (d) 600 m

345. Where any person is allowed to work or pass while the haulage in motion;manholes for refuge shall be provided at intervals of not more than.....?
(a) 10 m (b) 20 m (c) 30 m (d) 40 m

346. Where the gradient is less than 1 in 6 manholes may be provided at intervals of not more than at least.....?
(a) 10 m (b) 20 m (c) 30 m (d) 40 m

347. Man holes shall be not less than at least .....in height?
(a) 1.5 m (b) 1.8 m (c) 1.0 m (d) 2.5 m

348. Every manhole shall be kept clean and clear of obstruction and white washed both inside and for a distance of not less than at least ....around the aperture?
(a) 0.3 m (b) 0.6 m (c) 0.1 m (d) 1 m

349. At all places where tubs are coupled or uncoupled there shall be clear space of not less than atleast.....between the tubs and one side of the roadway and also between the adjacent tracks?
(a) 0.3 m (b) 0.6 m (c) 2 m (d) 1 m

350. When any roadway or face is in direct line with a haulage track and persons may be exposed to danger from runaway tubs.....shall be provided to prevent danger?
(a) Strong buffer (b) Drop warwick (c) Re-railer (d) Runaway switch

351. Every traveling roadway shall be not less than at least.....in height?
(a) 1.2m (b) 1.5 m (c) 1.8 m (d) 2.5 m

352. Every traveling roadway shall ;where the inclination exceeds.....from the horizontal in addition to steps or ladders with hand rails or ropes shall be provided?
(a) 30 deg (b) 45 deg (c) 60 deg (d) 80 deg

353. When two tubs are in tandem the gap between the inner most ends shall not be less than.....?
(a) 20 cm (b) 40 cm (c) 60 cm (d) 80 cm

354. Every tub shall be examined once at least in every.....?
(a) 30 days (b) 14 days (c) 7 days (d) 1 day

355. Two or more tubs shall not moved by hand when the distance between them at any time is less than at least.....?
(a) 5 m (b) 10m (c) 20 m (d) 30 m

356. The diameter of the deflection pulley should not be less than atleast.....times than the rope diameter?
(a) 60 (b) 100 (c) 40 (d) 120

357. The new haulage rope should have a FOS of at least.....?
(a) 7 (b) 9 (d) 10 (c) 6

358. The haulage rope should be discarded if...?
(a) FOS less than 7
(b) rope dia. is reduced by 15 %or more
(c) the total number of cracked or broken wires exceeds 3 over length of lay
(d) All of the above

359. Every roadway conveyor shall be so installed that between the conveyor and one side of the roadway; there is a travelling space of at least.....?
(a) 0.5 m (b) 1.5 m (c) 2 m (d) 1 m

360. The haulage track shall be examined once at least in every .....?
(a) 30 days (b) 14 days (c) 7 days (d) 1 day

361. No locomotive shall be used in where the gradient of the track exceeds at least.....?
(a) 1 in 6 (b) 1 in 7 (c) 1 in 15 (d) 1 in 20

362. No road for trucks and dumper shall have a gradient steeper than at least.....at any place?
(a) 1 in 6 (b) 1 in 7 (c) 1 in 10 (d) 1 in 14

363. No material shall be placed or dumped within at least.....from either side of the track of rails?
(a) 1.2 m (b) 1.5 m (c) 2.5 m (d) 3 m

EXPLOSIVES & BLASTING

364. No case or container shall contain more than at least.....of explosive?
(a) 5 kg (b) 10 kg (c)) 3 kg (d) 12 kg

365. Not more than .....of explosive shall be carried by one person?
(a) 5 kg (b) 10 kg (c) 3 kg (d) 12 kg

366. Not more than .....detonators are transported in a vehicle at a time?
(a) 100 (b) 200 (c) 300 (d) 400

367. A vehicle transporting explosives shall not be driven at a speed exceeding....kmph ?
(a) 15 (b) 20 (c) 25 (d) 30

368. No drill shall be used for boring a shot hole unless it allows a clearance of at least.....over a diameter or the cartridge of explosives?
(a) 0.3 cm (b) 0.6 cm (c) 0.5 cm (d) 0.8 cm

369. Except in stone drift not more than ....shots shall be fired in any one round?
(a) 5 (b) 10 (c) 15 (d) 20

370. If the number of shots fired per round is above.....then the shots shall be fired by electrically?
(a) 5 (b) 10 (c) 15 (d) 6

371. The shot firer shall use well insulated cable of sufficient length to permit him to take proper shelter and in no case shall the cable be less than at least.....long?
(a) 15 m (b) 10 m (c) 18 m (d) 25 m

372. When two working places belowground have approached within.....of each other the shot firer shall not fire any shot unless all persons have been withdrawn from the other working place?
(a) 3 m (b) 4.5 m (c) 6 m (d) 2 m

373. When the shaft or stone drift has reached within a distance of .....of any coal seam the use of non permitted explosives shall be stopped?
(a) 10 m (b) 20 m (c) 30 m (d) 15 m

374. Arrangement shall be made for suppression of coal dust with water within at least.....of the face?
(a) 60 m (b) 50 m 9c) 80 m (d) 100 m

375. No solid blasting shall be done when a geological disturbance has been detected or methane exceeds....?
(a) 0.3 % (b) 0.5 % (c) 0.8 % (d) 1 %

376. The shot firer shall carefully test for inflammable gas at all places within a radius of.....of the place of firing?
(a) 12 m (b) 18 m (c) 22 m (d) 25 m

377. The protective footwear shall be supplied at intervals of at least...?
(a) 3 months (b) 1 year (c) 2 years (d) 6 months

378. Life of the helmet for workers employed in opencast workings is?
(a) 2 years (b) 3 years (c) 4 years (d) 5 years

MVT Rules

379. Mines Vocational Training Rules..... as applicable for all mines. (fill i the blanks)

380. As per Rule 8 : Provided that the exemption granted to the persons specifie in clauses (d), (e), (f) and (g) shall be subjected to the condition that the sai person shall undergo a course.....
(a) Refresher Course (b) Advance Course (c) Short-term Course (d) None

381. Under MVTR 1966, Rule No. 4, that disputes regarding training in mines to be decided by .
(a) Chief Inspector of Mines (b) Regional Inspector of Mines
(c) Inspector of Mines (d) None

382. The in charge of a training centre attached to a mine is .....
(a) Training officer (b) Mines manager (c) Safety Officer (d) None

383. During the vocational training period each trainee is to be paid an allowance of Rs....per day?
(a) 1 (b) 1.5 (c) 2 (d) 2.5

384. The maximum number of days for vocational training in general is of ..?
(a) 6 days (b) 12 days (c) 18 days (d) 20 days

385. The maximum number of days for vocational training for working in gassy mines..?
(a) 6 days (b) 12 days (c) 18 days (d) 20 days

386. Every worker has to go vocational training once in.....years?
(a) 3 (b) 5 (c) 6 (d) 4

387. Every workmen belonging to the contractor in any mine has to underg training.
True/False

388. Refresher Training as per MVTR – 1960 is necessary for
(a) All persons employed in a mine
(b) Person who have absented for more than a year
(c) Training within one months of joining before or after his normal duty
(d) Both (b) and (c)

389. **MVTR is essential for**
(a) All categories of persons (b) Not for all categories of persons
(c) For RTPs only (d) None of the above

390. **There is provision for training of all persons like : officers, officials, supervisors in MVTR**
(a) Yes (b) No (c) Not known (d) None of the above

391. **Training is important for all the skilled workers employed in a U/G mechanized mine for**
(a) Safety (b) Efficiency
(c) Proper utilization of the machine (d) All of the above

392. **The following persons are to be trained**
(a) All operators (b) All skilled workers
(c) The workers employed in the face (d) All of the above

393. **Type of operation of the contractors not very good. What is the reason for this?**
(a) Lack of training
(b) Lace of safety consciousness
(c) Lack of knowledge of traffic rules
(d) General tendency of achieve target at any cost

394. **Why retraining is necessary?**
(a) To get training again
(b) To get knowledge of advancement in machinery
(c) To become more expert in machine performance with safety & effectiveness
(d) All above

395. **Special training for front line supervisors has been recommended in**
(a) 7th NSC (b) 8th NSC (c) 10th NSC (d) 9th NSC

396. **Special training of front line supervisors is**
(a) Not necessary (b) May be considered
(c) May be necessary (d) Absolutely necessary

397. **Training is necessary for**
(a) Development of skill & culture (b) Introduction of safe & efficiency
(c) Introduction of manners & discipline (d) All of the above

398. **Training should be given to**
(a) Operators (b) Workers
(c) Contractual persons (d) All of the above

399. **For introduction of safety, efficiency & productivity training is**
(a) A basic tool (b) A fundamental requirement
(c) A recommendation of NSC (d) All of the above

400. **In modern mechanised mines without a training centre :**
(a) Productivity cannot be achieved (b) Accident cannot be reduced
(c) Human resources cannot be developed (d) Profiting cannot be achieved
(e) All of the above

Industrial Relations (IR)

401. **No person employed in a public utility service shall go on strike in breach or contract without giving to the employer notice of strike within..?**
(a) 2 weeks before strike (b) 4 weeks before strike
(c) 6 weeks before strike (d) 8 weeks before strike

402. **No employer carrying on any public utility service shall lockout any of his workmen without giving notice of lock out within..... weeks before lockingout?**
(a) 2 (b) 4 (c) 6 (d) 8

403. **No person employed in a public utility service shall go on strike in breach of contract within.....days of giving strike notice?**
(a) 2 (b) 5 (c) 7 (d) 14

404. **No programme of safety can be successful unless the company has..?**
(a) assistance from DGMS (b) assistance from state safety council
(c) Internal safety organization (d) private safety organisation

405. **Minimum number of persons to form the trade union is..?**
(a) 5 (b) 6 (c) 7 (d) 8

406. **Lockout shall not declare during a pending of conciliation proceedings before a conciliation board and before .....after the conclusion of such proceedings?**
(a) 7 days (b) 14 days (c) 30 days (d) 40 days

407. **No workmen of an industrial establishment is entitled to a layoff compensation where less than .....workmen on an average per working day here been employed in preceding month?**
(a) 50 (b) 100 (c) 150 (d) 200

408. **Layoff compensation is paid if he is working below ground and attended .....days in one calendar year ?**
(a) 190 (b) 240 (c) 170 (d) 250

409. The layoff compensation payable to any workman during any period of 12 months shall not be more than .....?
(a) 15 days (b) 30 days (c) 45 days (d) 60 days

410. The most important function of the management is?
(a) Organisation (b) Planning (c) staffing (d) Controlling

411. The maximum span of control is?
(a) 1 to 3 (b) 4 to 5 (c) 5 to 6 (d) 7 to 8

412. Mining industry is organised by?
(a) Line organization (b) Function organization
(c) Line and staff organization (d) none

413. No worker shall be absent from work without permission for more than minimum .....days?
(a) 10 (b) 5 (c) 15 (d) 20

414. Punishment as suspension without pay should not exceed...days?
(a) 10 (b) 5 (c) 15 (d) 20

415. Indian trade union act comes in?
(a) 1926 (b) 1948 (c) 1947 (d) 1966

416. The termination of the services of a worker by way of disciplinary action is called?
(a) Retrenchment (b) lockout (c) dismissal (d) layoff

417. The termination of the services of a worker not by way of disciplinary action is called?
(a) Retrenchment (b) lockout (c) dismissal (d) layoff

418. Minimum age for the member in trade union is.....years?
(a) 15 (b) 16 (c) 18 (d) 20

419. The workmen has been paid at the time of retrenchment compensation equivalent to .....days average pay for every completed year?
(a) 15 (b) 10 (c) 18 (d) 20

420. No workmen shall declare a lockout during the pendency of the proceedings before a labour court tribunal and before.....after the conciliation of such proceedings?
(a) 7 days (b) 2 months (c) 3 months (d) 6 weeks

421. Lay off compensation is paid if the workmen worked in below ground for not less than minimum....days?
(a) 190 (b) 240 (c) 300 (d) 150

422. Notice should be given to workmen before .....when retrenched ?
(a) 1 month (b) 2 months (c) 3 months (d) 15 days

423. Conciliation officer shall send a report to govt. within .....days of start of concilation proceedings?
(a) 7 (b) 14 (c) 30 (d) 60

424. The court is only an investigatory authority and it submits its report to the govt within.....?
(a) 14 days (b) 1 month (c) 3 months (d) 6 months

425. Indirect loss is ....times more than the direct loss due to accident?
(a) 1 (b) 2 (c) 3 (d) 4

426. Board of conciliation members are.....?
(a) 1 to 2 (b) 2 to 4 (c) 4 to 6 (d) 2 to 8

427. A labour court consists of only one person who must have held judicial office in India for not less than ?
(a) 3 years (b) 5 years (c) 7 years (d) 10 years

428. No person can be appointed as the presiding officer of the Tribunal unless he has been a judge of the high court for not less than....?
(a) 3 years (b) 5 years (c) 7 years (d) 2 years

429. The number of persons under over man of all categories under his charge does not exceed?
(a) 50 (b) 100 (c) 200 (d) 300

430. It is recommended to appoint one safety officer in mine exceeding ....man power?
(a) 50 (b) 100 (c) 200 (d) 300

431. The minimum wages act comes in?
(a) 1952 (b) 1948 (c) 1947 (d) 1955

432. The money paid to worker in cash without any additional advantages is called?
(a) Nominal wages (b) Real wages (c) Minimum wages (d) Living wages

433. Underground allowance is ..... of the basic wage?
(a) 10 % (b) 15 % (c) 20 % (d) 5 %

434. The wage is paid to labour to raise their wages equal to the minimum wage for the specified work load in case they fail to fulfill the work norms?
(a) Fall back wages (b) Real wages (c) Minimum wages (d) Living wages

435. Giving additional leave is...?
(a) Financial incentive (b) Non financial incentive
(c) Negative incentive (d) Increment

436. Managing for minimising external control and maxmising internal motivation is achieved by?
(a) Proper Functiong (b) Decentralistion
(c) MBO technique (d) Line and staff organisation

437. Any combination whether temporary or permanent formed primarily for the purpose of regulating the relations btw workman and employers is called?
(a) Trade union (b) workmen committee (c) Safety committee (d) None

438. Industrial employment act (1946) is applied to every industrial establishment which employs minimum.....or more persons?
(a) 50 (b) 100 (c) 200 (d) 400

439. In case of C.I or R.I fails to inspect the place of accident within.....of occurrence the work may be resumed?
(a) 24 hours (b) 36 hours (c) 48 hours (d) 72 hours

440. Industrial tribunals consist of.....?
(a) 1 person (b) 2 persons (c) 3 persons (d) 4 persons

441. Work's committee is formed employing more than .....workers?
(a) 50 (b) 100 (c) 200 (d) 500

442. The welfare officer shall be assisted with additional welfare officer for every additional.....persons employed?
(a) 1000 (b) 2000 (c) 5000 (d) 500

443. If a member of committee leaves India for more than .....he shall tender his resignation?
(a) 3 months (b) 6 months (c) 1 year (d) 2 years

444. A fee for the manager's permit is.....Rs?
(a) 5 (b) 10 (c) 15 (d) 20

445. Safety classes and safety weeks are organised by?
(a) Safety officer (b) Vocational training officer
(c) Workmen's inspecter (d) manager

Testing & Examination of Equipment etc

446. Speed of the Main mechanical ventilator shall be examined once in.....?
(a) a day (b) 7 days (c) 14 days (d) 30 days

447. Winding rope shall be tested once in ...?
(a) a day (b) 7 days (c) 14 days (d) 30 days

448. Inspection of all entrances of the mine is done once in.....?
(a) a day (b) 7 days (c) 14 days (d) 30 days

449. All unused workings which are not sealed off and the isolation stoppings shall be inspected once in.....?
(a) a day (b) 7 days (c) 14 days (d) 30 days

450. All equipment provided for the fire fighting are tested once in .....?
(a) a day (b) 7 days (c) every month (d) 2 months

451. Checking of atmosphere behind stoping shall be done once in.....?
(a) a day (b) 7 days (c) 14 days (d) 30 days

452. When it is intended to reopen a mine or part thereof; which has been isolated; the manager shall not less than.....before commencement of such work give notice to R.I?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

453. A notice of construction of the water dam shall be send within.....?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

454. Every mechanical ventilator(Booster) in u/g mine shall be examined once in.....?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

455. Quantity of the air shall be calculated once in.....in deg III mine?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

456. Examination of air crossings; ventilation stoppings shall be done once in.....?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

457. The temperature and relative humidity of the mine air shall be calculated once in.....?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

458. The stone dust shall be tested once in.....?
(a) 30 days (b) 3 months (c) 6 months (d) 1 year

459. When working near the waterlogged area the plans are prepared up to date of.....?
(a) 15 days (b) 30 days (c) 3 months (d) 1 month

460. No person shall be employed in any seam where the outlets or openings of the seam are within.....of an active fire or spontaneous heating in a higher seam or fire on the surface?
(a) 30 m (b) 60 m (c) 10 m (d) 100 m

461. No person shall be employed where the parting with an overlying seam on fire or in which spontaneous heating has taken place consists of less than .....of hard rock?
(a) 30 m (b) 60 m (c) 10 m (d) 100 m

462. The type of fire extinguisher used in explosive van is?
(a) CTC type (b) CO_2 type, (c) Both 1 and 2 (d) None of the above

463. Every depillaring district shall be inspected .....?
(a) on every day, (b) once in 7 days (c) once in 14 days (d) on every idle day

Mines Rescue

464. How many rescue trained persons should be there in a rescue station to maintain a rescue bridge?
(a) 12 (b) 14 (c) 16 (d) 18

465. How many instructor should be there in a rescue station?
(a) 2 (b) 4 (c) 6 (d) 8

466. How many years of practical experience of below ground mines is mandatory for getting appointment of rescue superintendent?
(b) 3 (c) 4 (d) 5

467. At every below ground mine where there is no rescue station within its radiu of A Kms, the owner shall establish on the surface a rescue room. A is give by,
(a) 15 Km (b) 35 Km (c) 50 Km (d) 100 Km

468. It may be sufficient to provide one rescue room for a number of mines, if th total number of persons ordinarily employed in below ground working of a such mines does not exceed,
(a) 2500 (b) 5000 (c) 7500 (d) 10000

469. Which of the following functions of rescue station is not permitted by Chi Inspector even though the owner is allowed to establish a rescue room f group of mines having total no. of persons ordinarily employed is in exces of 5000
(a) imparting initial training in rescue & recovery work
(b) imparting refresher training to rescue trained person
(c) providing support by its own rescue teams & equipment in case of major accider
(d) carrying out function of rescue room where there is no rescue room

470. Where the following qualification or experience is not required for the post Instructor of a rescue station?
(a) to be a rescue trained person
(b) three years of practical experience of below ground mines
(c) holds a manager's certificate with not restricted to opencast mines
(d) holds a First Class Managers certificate of a type restricted to opencast workin

471. What should be the duration of posting a rescue trained person in a resc station?
(a) 1-5 years (b) 6-10 years (c) 11-15 years (d) 16-20 years

472. Which of the following apparatus, equipments is not recommended to ke at rescue room?
(a) Breathing apparatus (b) Reviving apparatus
(c) Smoke (d) Scissors

473. How many CO-tubes to be kept at the surface of the mine where no resc room is located close to the mine entrance?
(a) 4 (b) 6 (c) 8 (d) 10

474. **Which of the following duties & responsibilities is not to be done statutorily by the Superintendent of rescue station?**
(a) he shall ensure that adequate stock of spare parts & supplies are kept in the station
(b) he shall not countersign the records maintained under sub rule (1) or rule 13
(c) he shall make periodical inspection of rescue station & apparatus under his control
(d) he shall ensure that all the apparatus, equipments are maintained in perfect order

475. **In the event of emergency at underground mine, Superintendent shall perform rescue & recovery work & within 'A' days shall send a report to the RI or CI of Mines. 'A' is given by**
(a) 3 (b) 5 (c) 10 (d) 14

476. **The manager of a below ground mine where more than 100 persons are ordinarily employed below ground shall ensure that at least 'A' numbers of rescue trend persons are readily available at surface at any time. A is given by**
(a) 5 (b) 7 (c) 9 (d) 12

477. **The manager of a below ground, where more than 'A' persons are ordinarily employed shall also ensure that persons at the rate of one man for every hundred or part should be rescue trained. 'A' is given by,**
(a) 200 (b) 400 (c) 500 (d) 700

478. **Which of the following qualifications is not desirable for getting selection in training in training in rescue work?**
(a) he is between 21 & 30 years of age
(b) holds a valid first aid certificate
(c) he must have Diploma in the respect branch of engineering
(d) he is certified by the qualified medical practitioner to be free from any organic disease or meekness

479. **State the number of the schedule that must be followed for the refresher course of rescue trained person**
(a) III (b) V (c) VII (d) X

480. **Every rescue trained person shall be re-examined once at least in every 'A' Month by a qualified medical practitioner. A is given by**
(a) 6 (b) 12 (c) 18 (d) 24

481. **The base that is established by the rescue team near to irrespirable zone for conducting rescue work is known as**
(a) rescue room (b) rescue station
(c) fresh airbase (d) recovery zone

482. **Which of the following provisions is not essential in a fresh airbase kept for the prupose of rescue work?**
(a) Reviving apparatus (b) Oxylog machine
(c) Hygrometer (d) Flame safety lamp

483. **Prior to going down the mine the lender of the rescue team shall take clear instructions from**
(a) Manager of the mine (b) Safety officer of the mine
(c) Superintendent of rescue (d) General Manager Safety

484. **While using rescue apparatus, the leader shall carry a watch to record the pressure of compressed oxygen at an interval of 'A' minutes. A is given by**
(a) 15 (b) 20 (c) 25 (d) 30

485. **What should be the maximum period for remaining inside the mine for doing rescue work using breathing apparatus?**
(a) 0.5 hr (b) 1.5 hr (c) 2 hr (d) 2.5 hr

486. **What should be the minimum no. of persons in a rescue team using breathing apparatus?**
(a) 5 (b) 6 (c) 7 (d) 8

487. **In which schedule the signals for using by the members of the rescue team are prescribed?**
(a) V (b) VI (c) VII (d) VIII

488. **No person will be allowed to commence second spell of work in irrespirable atmosphere until unless**
(a) he is qualified enough for the work
(b) he refuses his breathing apparatus
(c) he pays for it
(d) he is examined and found fit by a qualified medical practitioner

489. **In which schedule the list of equipment to be kept at rescue station is prescribed?**
(a) I (b) II (c) III (d) IV

490. In which schedule the list of equipment to be kept at rescue room is prescribed?
(a) I (b) II (c) III (d) IV

Method of Work

491. For what depth of coal seam from surface, the distance between centers of adjacent pillars shall not be less than 45 m for a gallery width of maximum 4.8 m
(a) 60-90 m (b) 90-150 m (c) 150-240 m (d) 240-340 m

492. In coal, the sides shall either be kept sloped at an angle of safety not exceeding ..... degrees from the horizontal, or the sides shall be kept benched and the height of any bench shall not exceeds three metres and the breadth thereof shall not be less than the height:
(a) 60 Degree (b) 45 Degree (c) 75 Degree (d) None

493. Practice Question CMR 99
The distance between the centres of any adjacent pillars left in a seam or section shall not be less than that specified in the appended table as corresponding to the depth of the seam or section from the surface at that point and the width of the galleries in the workings in question.

Depth of seam from surface	Where the width of the galleries does not exceed 3.0 metres	Where the width of the galleries does not exceed 3.6 metres	Where the width of the galleries does not exceed 4.2 metres	Where the width of the galleries does not exceed 4.8metres
	The distance between center of adjacent pillars shall not be less than			
1	2	3	4	5
	Metres	Metres	Metres	Metres
Not exceeding 60 metres	12.0	15.0	18.0	19.5
Exceeding 60 but not exceeding 90 meters	13.5	16.5	19.5	21.0
Exceeding 90 but not exceeding 150 metres	16.5	19.5	22.5	25.5
Exceeding 150 but not exceeding 240 metres	22.5	25.5	30.0	34.5
Exceeding 240 but not exceeding 360 metres	28.5	34.5	39.0	45.0
Exceeding 360 metres	39.0	42.0	45.0	48.0

494. The distance between the centres of any adjacent pillars left in a seam or section shall not be less than that specified – for a mine, where the width of the galleries does not exceed 3.0 metres as corresponding to the depth of the seam or section from the surface exceeding 240 metres but not exceeding 360 metres, will be .....
(a) 28.5 (b) 29.5 (c) 30.5 (d) 14.5

495. During the extraction of pillars, no splitting or reduction of pillars or heightening of galleries shall be affected for a distance greater than the length of .....pillars ahead of the pillar that is being extracted or reduced : Provided that where pillar extraction is about to begin in a district such splitting or reduction of pillars or the heightening of galleries shall be restricted to a maximum of four pillars. The width of the split-galleries shall not exceed the width prescribed for galleries under regulation 99(4).
(a)length of two pillars (b) length of one pillar
(c) length of 3 pillars (d) None

496. Multi-section and contiguous workings – (1) No work in a higher seam or section shall be done over an area in a lower seam or section which may collapse.
(2)(a) No workings shall be made in more than one section in any seam, nor shall workings made in any two seams lying within .....metres of each other, without the prior permission in writing of the Chief Inspector and subject to such conditions as he may specify therein.
(a) 8 m. (b) 9 m. (c) 10 m (d) None

497. The parting left between any two such seams or section shall not be less than ..... metres in thickness at any place
(a) 4 m. (b) 3 m. (c) 6 m. (d) None

498. During extraction of coal pillars so splitting or reduction of pillars or heightening of galleries is permitted
(a) upto max. of 4 pillars ahead of the pillar is being extracted
(b) upto max. of 3 pillars ahead of the pillar is being extracted
(c) upto max. of 2 pillars ahead of the pillar is being extracted
(d) upto max. of 1 pillars ahead of the pillar is being extracted

499. Where pillar extraction is about to begin splitting or reduction of pillars or heightening of galleries shall be restricted to
(a) maximum 1 pillar (b) maximum 2 pillar
(c) maximum 3 pillar (d) maximum 4 pillar

500. **In order to take care of air blast which of the following statement is true?**
(a) to get for faster rate of production (b) to bring down goaf at regular intervals
(c) to reduce pillar size (d) to-extract-panel barriers first

501. **In de-coaled areas or voids, Colliery Manager has to submit which of the following to include in Return?**
(a) quantity of sand stowed (b) quantity of coal raised
(c) quantity of coal raised and quantity of sand stowed during preceding month
(d) quantity of coal raised and quantity of sand stowed during current month

502. **Extraction of coal by a method other than Bord & Pillar has been stipulated in**
(a) CMR 100 (b) CMR 100A (c) CMR 103 (d) CMR 103A

503. **No workings shall be made and no work of extraction or reduction of pillars shall be done within "A" m of any railway line or public works. A is given by**
(a) 15m (b) 30m (c) 45m (d) 60m

504. **Which of the following limit of work near mine boundaries is permitted under CMR 1957?**
(a) upto a distance equal to half of the distance specified in column 5 of CMR 99
(b) CMR 99
(c) upto 90m of the last face
(d) upto the boundary of neighbouring mine

505. **It is mandatory to post approved copy of the SSR at conspicuous places of the mine. Which of the following is not treated as such place?**
(a) lamp room (b) time keeper room
(c) haulage engine room (d) mine entrance

506. **Where occupied buildings are situated within atleast.....of any haulage road a substantial fence shall be provided ?**
(a) 10 m (b) 20 m (c) 30 m (d) 15 m

507. **In alluvial or coal the sides shall be sloped at an angle of safety not exceeding atleast.....from horizontal?**
(a) 30 deg (b) 35 deg (c) 45 deg (d) 60 deg

508. **In alluvial the height of the bench shall not exceed.....?**
(a) 1.2m (b) 1.5 m (c) 2.5 m (d) 3 m

509. **In coal the height of the bench shall not exceed.....?**
(a) 1.2m (b) 1.5 m (c) 2.5 m (d) 3 m

510. **No tree;loose stone or debris shall be allowed to remain within the distance of .....from the edge or side of the excavation?**
(a) 1.2m (b) 2.5 m (c) 3 m (d) 4m

511. **No gallery in a seam or section shall exceed at least .....in height?**
(a) 3 m (b) 2.5 m (c) 4.8 m (d) 5.5 m

512. **No gallery in a seam or section shall exceed atleast .....in width?**
(a) 3 m (b) 2.5 m **(c) 4.8 m** (d) 5.5 m

513. **DGMS recommends that areas having cover less than .....should not be developed?**
(a) 7.5 m (b) 15 m (c) 10 m (d) 20 m

514. **During depillaring the pillar shall be splitted upto maximum ....stooks?**
(a) 2 (b) 3 (c) 4 (d) 6

515. **Where the voids formed as a result of extraction are stowed with sand; the owner or manager shall on or before ....of every month submit to R.I giving details of stowing?**
(a) 10th day (b) 14th day (c) 5th day (d) 20th day

516. **No caving is permitted where thickness of the hard cover is less than at least....?**
(a) 7.5 m (b) 15 m (c) 10 m (d) 20 m

517. **Extraction of a thickness 't' of the lower seam is permitted by caving when its parting with the upper seam is atleast...?**
(a) 7t (b) 10t (c) 15t (d) 20t

518. **A fall is indicated when daily convergence/average daily convergence ratio equal or more than...?**
(a) 1 (b) 2 (c) 3 (d) 4

519. **No combustible material should be dumped within .....of any part of workings belowground even after completion of extraction?**
(a) 5 m (b) 10 m (c) 15 m (d) 20 m

520. **Maximum convergence should not exceed ...mm/m in case of sandstone roof and ....mm/m in case of coal or shale roof?**
(a) 60 ; 45 (b) 45 ;60 (c) 30 ;45 (d) 45 ; 30

521. Generally in coal seams having inclination of more than atleast.....the pillars develop a turning moment due to vertical and horizontal forces?
(a) 1 in 3 (b) 1 in 4 (c) 1 in 6 (d) 1 in 8,2

522. The stresses created by an opening extend upto a distance which is about....times the height of the opening?
(a) 1.3 (b) 1.5 (c) 1.75 (d) 2.1

523. No workings shall be made and no work of extraction or reduction of pillars shall be conducted any point within.....of any railway?
(a) 30 m (b) 45 m (c) 100 m (d) 60 m

524. The provision of SSR shall apply every development working within .....of face and every junction of roadways immediately out bye of a developing face?
(a) 10 m (b) 20 m (c) 30 m (d) 15 m

525. The hole dia. should be more than.....mm larger than bolt dia?
(a) 8 to 12 (b) 4 to 8 (c) 1 to 4 (d) 12 to 16

526. Where prop is set on sand or other loose material a flat base piece not less than ....in thickness shall be used?
(a) 5 cm (b) 10 cm (c) 15 cm (d) 20 cm

527. The cogging members shall be not less than .....in length?
(a) 2.5 m (b) 1.8 m (c) 1.5 m (d) 1.2 m

528. In the workings having an inclination atleast .....or more from the horizontal ;adequate precautions shall be taken to prevent danger to persons from falling?
(a) 30 deg (b) 45 deg (c) 60 deg (d) 20 deg

529. No person shall work or be permitted to work at any place having an inclination at least....?
(a) 30 deg (b) 45 deg (c) 60 deg (d) 20 deg

530. No person shall carry or permitted to carry any load along a road or footpath having inclination of at least....or more from the horizontal?
(a) 30 deg (b) 45 deg (c) 60 deg (d) 20 deg

531. Every road or footpath breadth shall not be less than at least...?
(a) 2.5 m (b) 1.8 m (c) 1.5 m (d) 1 m

532. Every road or footpath suitable steps shall be provided if the inclination a least exceed...?
(a) 30 deg (b) 45 deg (c) 60 deg (d) 15 deg

533. An underground coal mine employing 1200 persons experiences 2 fata injuries, 6 serious injuries and 8 reportable injuries during the year 2013 The total injury rate per 1000 persons employed for the year is _____

534. In self-contained chemical-oxygen self rescuer, oxygen is produced by
(a) Hopcalite (b) potassium peroxide
(c) sodium hydroxide (d) Protosorb

Mine Ventilation

535. Ventilation officer shall determine the efficiency of the main mechanica ventilator once at least in every....?
(a) day (b) 6 months (c) 3 months (d) 1 year

536. The arrangements for the wet cutting at the faces and water spraying at anc within.....of the working place are properly done?
(a) 30 m (b) 60 m (c) 120 m (d) 90 m

537. The owner shall at least once in every.....examine the rate of emission o inflammable gas?
(a) 30 days (b) 60 days (c) 100 days (d) 120 days

538. All surface structures and supports within a horizontal distance of.....fron all entrances to a mine shall be of fire proof material?
(a) 5 m (b) 10 m (c) 15 m (d) 20 m

539. No person shall light a fire or permit a fire to be lighted in any opencas working or within a distance of.....from any entrance to a mine?
(a) 5 m (b) 10 m (c) 15 m (d) 20 m

540. All unused workings connected to the surface through a walkable entranc which is not permanently closed; shall once at least in every .....be inspectec by competent person?
(a) 15 days (b) 30 days (c) 60 days (d) 100 days

541. The mine air shall be tested for percentage of CO once at least in every .....
(a) 7 days (b) 15 days (c) 30 days (d) 60 days

542. A place shall be called as harmful if the dust concentration exceeds...mg/m³?
(a) 2 (b) 3 (c) 4 (d) 5

543. All results of measurement of airborne respirable dust and all other relevant particulars shall be systematically recorded within.....of the date of collection of samples?
(a) 7 days (b) 14 days (c) 30 days (d) 2 months

544. No screening plant shall be placed within at least.....of the top of downcast shaft?
(a) 60 m (b) 50 m (d) 80 m (d) 100 m

545. Every working face and the floor; roof and sides of every roadway or airway within .....unless naturally wet thorough out; wetted during work shifts?
(a) 50 m (b) 70 m (c) 100 m (d) 150 m

546. A mine or part thereof shall be called as naturally wet if the moisture content is at least ....or more?
(a) 20 % (b) 30 % (c) 40 % (d) 60 %

547. Stone dust barriers should be provided if the percentage of inflammable gas at least is .... or more?
(a) 4 % (d) 5 % (c) 6 % (d) 7 %

548. If the coal containing less than 30 % V.M then the percentage of incombustible matter in stone dust is?
(a) 75 % (b) 65 % (c) 55% (d) 85 %

549. If the coal containing more than 30 % V.M then the percentage of incombustible matter in stone dust is?
(a) 75 % (b) 65 % (c) 55% (d) 85 %

550. Representative sample dust shall be collected once in every .....?
(a) 30 days (b) 60 days (c) 14 days (d) 7 days

551. The sample dust shall be sent within .....of taking of each sample?
(a) 7 days (b) 14 days (c) 30 days (d) 60 days

552. Where any working is extended to within.....of goaf or disused workings containing an accumulation of inflammable gas there shall be maintained at least one borehole not less than 1.5 m deep in advance of the working?
(a) 50 m (b) 70 m (c) 30 m (d) 60 m

553. No brick dam shall be less than at least....in thick?
(a) 1.8 m (b) 1.5 m (c) 2 m (d) 2.5 m

554. Every mechanical ventilator shall be installed on the surface at a distance of not less than .....from the opening of the shaft or incline at any point?
(a) 10 m (b) 20 m (c) 30 m (d) 15 m

555. Every stopping between the main intake and main return airway shall be constructed of masonary or brickwork not less than at least.....in thickness?
(a) 15 cm (b) 25 cm (c) 38 cm (d) 50 cm

556. If the mine is first or second degree and at the 7.5 m out bye of the discharge end of an air pipe then the velocity of the air is?
(a) 30 m/min (b) 15 m/min (c) 60 m/min (d) 45 m/min

557. In third degree at the maximum span of the longwall face; the maximum velocity of the air is?
(a) 30 m/min (b) 15 m/min (c) 60 m/min (d) 75 m/min

558. Air entering any of the auxiliary fans in the district shall not contain more than at least....of methane?
(a) 0.3 % (b) 0.5 % (c) 0.8 % (d) 1 %

559. The percentage of methane in the return air in any heading ventilated by an auxiliary fan shall not exceed.....?
(a) 0.3 % (b) 0.5 % (c) 0.8 % (d) 1 %

560. The air samples shall be analysed within ....of the taking thereof?
(a) 4 days (b) 7 days (c) 14 days (d) 30 days

561. If any determination shows the percentage of inflammable gas to exceed.....determination shall be made or samples of air taken at intervals not exceeding 24 hours?
(a) 0.6 % (b) 0.8 % (c) 1 % (d) 1.25 %

562. No working or gallery shall be extended to a distance of more than 4.5 m from the nearest ventilation connection unless the current of air is coursed up to a point within.....of the face?
(a) 3 m (b) 2 m (c) 4.5 m (d) 6 m

563. No narrow main or advance gallery shall be driven more than ..... ahead of the widened gallery?
(a) 3 m (b) 2 m (c) 4.5 m (d) 6 m

564. **The partition between the top and bottom airways shall be of R.C.C not less than .....thick?**
(a) 15 cm (b) 30 cm (c) 40 cm (d) 60 cm

565. **The top and bottom of every haulage plane every regular stoping place expect within.....of the face; the roof and sides shall be white washed ?**
(a) 60 m (b) 50 m (c) 200 m (d) 100 m

566. **Intrinsically safe apparatus is such an apparatus**
(a) which is inherently incapable of creating spark of sufficient intensity to ignite firedamp
(b) which is safe in operation as no hot gases comes out of it
(c) it is operated at a lower level of temperature
(d) it has an overload protection

567. **What percentage of (CO formed/O_2 absorbed) ratio indicates existence of heating?**
(a) 0.5% (b) 1% (c) 2% (d) 3%
[Notes :CMR18.In order that spontaneous heating is detected in early stages, the air in the return airway of every depillaring district, and of every goal which has not been isolated, shall be;
(i) tested for percentage of carbon monoxide once at least in every seven days with an automatic detector of a type approved by the Chief Inspector; and
(ii) completely analysed once at least in every 30 days with a view to determining the ratio CO-formed/O_2- absorbed.
CMR 19. ***Apparatus for testing for Carbon Monoxide*** *- In every fiery seam there shall be kept at the mine constantly available for use two or more suitable birds or other means of detecting carbon monoxide gas approved by the Chief Inspector :]*

568. **Every main mechanical ventilator in a mine shall be capable of producing adequate ventilation in the mine or part and shall be installed on the surface at a distance of not less than 10 metres from the opening of the shaft or incline at any point:**
(a) not less than 8 metres (b) not less than 10 metres
(c) not less than 12 metres (d) not less than 12 metres

569. **In every gassy seam of the second or third degree if electricity is used for driving the mechanical ventilator electrical energy shall be supplied to the drive motor of the ventilator through a separate circuit from the main distribution point of the mine.**
(a) separate circuit (b) same circuit (c) None

570. **There shall be provided an maintained at every main mechanical ventilator, a recording instrument to continuously register the .....developed.**
(a) Temperature (b) Pressure (c) Humidity (d) None
[*Pracitce* [1][136A. ***Velocity of Air Current*** – The velocity of air current measured in metres per minute at the place shown in column (2) shall be not less than that shown in column (3) for the different seams shown in column (a) of the Table given :

Degree of gassiness	Place where velocity of air is to be measured	Velocity of air
1	2	3
First [2][Second or Third] degree	Immediate outbye ventilation connection from the face.	30
[1][First of] Second degree	(i) 4.5 metres from any face whether working or discontinued on the intake side of the brattice or partition;	30
	(ii) 7.5 metres outbye of the discharge end of an air pipe;	15
	(iii) at the maximum span of along wall face.	60
Third degree	(i) 4.5 metres from any face whether working or discontinued on the intake side of the brattice or partition;	45
	(ii) 7.5 metres outbye of the discharge end of an air pipe;	25
	(iii) at the maximum span of along wall face.	75

Provided that if in the opinion of the Chief Inspector or the Regional Inspector the compliance with the above provision is not practicable or not necessary, he may, be an order in writing and subject to the conditions specified therein exempt partially or totally any mine from the provisions of this regulation.]

Roof Support

571. **Setting of support – (1) (a) Every prop shall be set securely and on a sound foundation, shall be kept tight against the roof.**
(b) Where a prop is set on sand or, other loose material, a flat base-piece not less than 5 centimeter in thickness 25 centimeters in width and 75 centimeters in length shall be used.
(c) The lid used over a prop shall have a width not less than the diameter of the prop, a thickness not less than 8 centimeters and a length not less than 50 centimeters.
TRUE/FALSE

572. **What should be the degree of fleet angle?**
(a) 1.5° (b) 2.5° (c) 3.5° (d) 5°

573. **Water seals are provided at -**
(a) with stowing pipe (b) isolation stoppings
(c) with explosive cartridges (d) in water reservoir

574. **Support at the goaf edge is made the strongest – why?**
(a) to keep the immediate roof intact
(b) support requirement in other areas will minimum
(c) it will help roof to break (d) to resist coal bumps

575. **Why lime is sprinkled on the accumulation of black damp?**
(a) it absorbs CO_2 in the black damp (b) it resists coal dust explosion
(c) it resists gas explosion (d) it gives off H_2O to extinguish fire

576. **The width of a manhole is kept not less than 0.75 m but not more than 1 m – why?**
(a) to allow 2 persons to enter easily for shelter
(b) not to allow the tub to enter into the manhole
(c) to keep stone dust bags etc. inside it (d) all of the above

577. **Why galleries are sometimes staggered?**
(a) it will help to install transport system
(b) to avoid excessive exposure of roof at a place
(c) to keep stone dust bags etc. inside it (d) all of the above

578. **Why is it mandatory to remove silt from the sump?**
(a) to maximize the sump capacity
(b) to maintain regular flow of water in mines
(c) to minimize the head of water (d) to allow pump khalasi to enter

579. **Why heavy stone dust barriers are located farther from the face?**
(a) it will help extinguish fire rapidly
(b) the wave of explosion becomes stronger & stronger as it reavels away from the face requiring maximum stone dust to tackle it
(c) to diminish the possibility of dust explosion
(d) to brighten the galleries away from facts

580. **Why formation of 'V' between two goafs is avoided during depillaring?**
(a) to avoid the concentration of pressure of 'V' point
(b) to minimize the requirement of support
(c) to get maximum coal O/P (d) to prohibit air blast

581. **Why a layer of coal is left against the shale roof?**
(a) shale roof has the tendency to depart from immediate coal roof
(b) to makes the roof weaker
(c) to avoid subsidence
(d) to restrict inrush of water

582. **In cross bar support, the side clamps are put in holes of at least A cm deep made in coal pillar side. A is given by**
(a) 10cm (b) 20cm (c) 30cm (d) 50cm

583. **In safari support the minimum number of laggings to be given is decided as**
(a) 1 for every meter length of the bar
(b) 2 for every meter length of the bar
(c) 3 for every meter length of the bar
(d) Any number for every meter length of the bar

584. **In order to avoid dislodgement of support during blasting, DGMS Circular 9/1977 stated on**
(a) tightening of roof support (b) maximum possible contact at roof
(c) strategically placed cogs (d) pair of cross bar supports

585. **Substantial fencing shall be maintained around the excavation formed as a result mining operation which extends within a distance of A m from a public road or building. A is given by**
(a) 5m (b) 15m (c) 30m (d) 45m

586. **Before a mine is abandoned the owner, agent or manager shall cause the top of entrance of every shaft be fenced by which of the following type of permanent structure**
(a) U_2 type (b) G_1 type (c) G_2 type (d) S_2 type

587. **Mining Sirdar is authorized in perform half of the maximum number of shots to be fired by Shotfirer only when**
(a) the mine is mechanized
(b) manual working is being done where workers is < 30
(c) manual working is being done where workers is > 30
(d) Any number of workers in mechanized mines

588. **In accordance with CMR 113, the minimum number of inspection to be done by Mining Sirdar in respect of roadway and other working places at which persons are engaged and required to access is**
(a) 1 (b) 2 (c) 3 (d) no such stipulation

589. **In second or third degree gassy mine, use of electric melding apparatus is permitted by**
(a) Colliery Manager (b) Agent
(c) Regional Inspector (d) Director (Technical)

590. **Inflammable gas shall be deemed to have been found or detected when certain percentage of gas is indicated by lowered flame safety lamp. What is that percentage?**
(a) 0.5% (b) 0.75% (c) 1.25% (d) 3

591. **When percentage of inflammable gas falls below 0.6, determination shall be done in**
(a) once in 7 days (b) once in 24 days (c) once in 15 days (d) once in 30 days

592. **While enquiring into a fatal accident to four persons due to fall of roof, the enquiry revealed the following statements. Mark which is not relevant –**
(a) Diagonal extraction of extraction was followed
(b) Prescribed manner of extraction was not followed
(c) Goaf edge supports as prescribed in the approved SSR were not provided
(d) Convergence recorders were not provided.

593. **In the dump rock above pheratic surface, for reducing ground water pressure, effective drainage system shall be provided both ..... and ..... the overburden dump.**

Accident/Risk Assessment/Safety Management

A-1 ***An accident had occurred in a depillaring district due to air blast in which two persons received fatal injuries and five received serious injuries. Answer the questions below :***

594. **What type of accident it refers to?**
(a) Minor (b) Major (c) Fatal (d) Disaster

595. **How many persons are involved in the accident due to air blast?**
(a) 2 Fatals and 5 Serious (b) 7 persons in all
(c) No persons (d) None of the above

596. **What is the cause of the accident ?**
(a) Roof fall in goaf (b) Major roof fall with air blast
(c) Air blast only (d) None of the above

597. **Who is responsible for the accident?**
(a) Mining Sirdar (b) Over-man
(c) Asst. Manager (d) Over-man and Mining Sirdar

598. **What is the nature of violation?**
(a) Improper support (b) Negligence in support testing
(c) Regular roof fall in goaf overlooked (d) None of the above

A-2 ***An under manager had received injuries in a depillaring panel while directing withdrawal supports from the goaf edge.***

599. **Who got the injuries?**
(a) Under manager (b) Supervisor (c) Timber mistry (d) None

600. **What is the cause of accident?**
(a) Fall of roof (b) Malfunctions of the prop withdrawer
(c) Fault of supervisor (d) None of the above

601. **What is the nature of violation?**
(a) Negligence of the spot supervisor
(b) Ignorance of the support withdrawal gang
(c) Lack of training (d) Fault of the manager

A-3 ***In a rise gallery in a development district while a group of drillers where drilling, adjoining dip gallery, which was within a distance of 3m from the rise face was fired resulting in death of the drillers.***

602. **What is the cause of the accident?**
(a) Negligence of the front line supervisor (b) Negligence of the shot firer
(c) Negligence of the mining sirdar (d) Negligence of the drilling gang
(e) All of the above

603. **What is the cause of the above accident?**
(a) Narrow parting of 3m (b) Blasting in dip gallery
(c) Drilling in the rise gallery (d) None of the above

604. **How to prevent such type of accidents in future?**
(a) Driving gallery from one side only (b) Ensure the parting of at least 10m
(c) Stoppage of all working within 30m (d) All of the above

A-4 ***During withdrawal of timbers, an under manager was instructing the gang to expedite the work. He got fatally injured when roof fall occurred.***

605. **What the cause of accident?**
(a) misadventure (b) interference with experienced support gang
(c) Not taking care of his own safety (d) All of the above

606. **Who is responsible for the accident?**
(a) Mining sirdar (b) Over man (c) Timber mistry (d) Under manager

A-5 In an opencast mine due to fall of dumper from haul road to the lower bench, one worker was killed.

607. What is the cause of accident?
(a) Negligence of the driver (b) Driving at high speed
(c) Failure of brake (d) All of the above

608. How to prevent such accidents?
(a) Maintaining low speed (b) Following traffic rules
(c) Regular training of the dumper operator (d) All of the above

A-6 In opencast mines major accidents have taken place due to movement of dumpers.

609. What is the major cause of accidents due to dumpers
(a) Poor maintenance of dumpers (b) High speed of driving
(c) Failure of break (d) Poor condition of haul road

610. Who is responsible for this type of accident
(a) Operator (b) Shift in-charge (c) Engineer (d) None

611. How to prevent such accidents
(a) Driving at a specified speed (b) Haul road maintenance
(c) Not following traffic rules (d) None of the above

612. Match the following items in M with N

M		N	
1.	Committee A	P.	Small Scale Mining
2.	Committee B	Q.	Status of implementation of 10th National Safety Conference in Mining
3.	Committee C	R.	Surface of Underground Transport Machinery
4.	Committee D	S.	Safe health & welfare of contractual workers

(a) 1-P, 2-Q, 3-S, 4-R (b) 1-Q, 2-P, 3-S, 4-R
(c) 1-Q, 2-P, 3-R, 4-S (d) 1-P, 2-Q, 3-R, 4-S

613. The rate of accidents may be expressed
(a) On production basis (b) On employment basis
(c) Both (a) and (b) (d) None of them

614. On production basis, the rate of accident is calculated on the basis of
(a) Per million tonne of production (b) Per 1000 tonne of production
(c) Both (a) and (b) (d) None of them

615. On employment basis, accident rate is calculated
(a) Per million tonne of production (b) Per 1000 tonne of production
(c) Both (a) and (b) (d) None of them

616. For calculation of severity rate of mines we need following information
(a) Number of total cases in the given period
(b) Number of severe cases in the given period
(c) Number of reportable cases in the given period
(d) All of the above

617. A mine is considered prone to accident if severity rate is
(a) less than 12 (b) equal to 12 (c) more than 12 (c) none

618. Who conducts OHS?
(a) Inspectors from DGMS (b) A civil surgeon from State Govt.
(c) Mine Medical Officers (d) None

619. OHS is necessary for –
(a) Better industrial health (b) More safe and efficient work
(c) For reduction of medical expenses (d) None of the above

620. Accident during dressing of the face is due to –
(a) Hurriedness (b) Inexperience (c) Lack of training (d) All of the above

621. Accident while dressing of the face can be reduced by –
(a) Following SOP (b) Introduction of training
(c) Proper supervision (d) All of the above

622. Accident frequency rate is calculated in terms of .....persons employed?
(a) 100 (b) 1000 (c) 10000 (d) 100000

623. Accident frequency rate is calculated in terms of .....man shifts worked?
(a) 100 (b) 1000 (c) 10000 (d) 100000

624. Accroding to CMR; Minor injury means the injury other than serious bodily injury or reportable injury which results in the enforced absence from work of the person injured for period at least exceeding...?
(a) 24 hours (b) 36 hours (c) 18 hours (d) 72 hours

625. The statement in respect of responsibilites of the agent shall be submitted within.....?
(a) 7 days (b) 15 days (c) 30 days (d) 40 days

626. The owner or manger shall inform to R.I by telephone and shall be give notice within ...of such accident occurrence?
(a) 12 hours (b) 24 hours (c) 36 hours (d) 48 hours

627. The owner or manager shall put a notice an notice board within.....of occurrence of accident?
(a) 7 days (b) 14 days (c) 30 days (d) 40 days

628. Where any person employed in a mine contacts any disease notified by the central govt; the owner or manager shall within .....of his being informed to the D.M?
(a) 24 hours (b) 3 days (c) 2 days (d) 5 days

629. Intimation of minor accidents involving at least .....is required to be sent to the C.I and R.I?
(a) 5 (b) 6 (c) 4 (d) 3

630. A copy of the entries in the register regarding accidents shall be sent by the owner of the mine to the chief inspector on or before....in the year following that to which the entries relate?
(a) 20th Jan (b) 20th Feb (c) 20th March 20th Aapril

631. The central govt. may direct that accidents other than reportable and serious; which cause bodily injury resulting in the enforced absence from work of the person injured for a period exceeding.....shall be entered in the registry?
(a) 12 hours (b) 24 hours (c) 48 hours (d) 72 hours

632. Reportable injury means any injury which involves the enforced absence of the injured person from work for a period of .....?
(a) 24 hours (b) 36 hours (c) 72 hours (d) 144 hours

633. Any injury which involves the permanent loss of any part or section of the body is called?
(a) Minor injury (b) Reportable injury
(c) Fatal injury (d) Serious bodily injury

Risk Assessment

634. The Take 5(Personal Risk Assessment) process consists of five steps as at column (A). AT column (B) the observations are mentioned. Match A & B.

Column A	Column B
(i) Stop, step back, observe	(a) If the hazard is not controlled and the work area not safe – do not start work, report to your superior official to review the risk assessment
(ii) Think through the task	(b) Once all control measures have been safelyimplemented – commence the task.
(iii) Identify any hazards	(c) Observe the work area and surrounding location for hazards.
(iv) Control the hazards	(d) Consider the sequence of steps involved in carrying out the task from start to finish.
(v) Complete the task	(e) Identify the hazards associated with the task including any present in the immediate and surrounding work area, and hazards generated by the task.

635. It is the overall process of risk analysis and risk evaluation
(a) risk management (b) risk assessment
(c) risk control (d) risk rating

636. A structured process composed of well defined system emphasizing continuous improvement in a work quality, health, welfare and productivity known as
(a) safety information system (b) risk management
(c) safety management system (d) safety audit

637. It is a working document outlining all actions to be carried out to ensure safety and health at work place. Identify from the list below
(a) safety management plan (b) health impact assessment
(c) health review issues (d) risk assessment matrix

638. What is the full from of IDRM?
(a) integrated disaster risk management
(b) Indian disaster rate monitoring
(c) infrastructure development related management
(d) immediate development of rural market

639. DGMS comes under
(a) Mines Ministry
(b) Labor & Employment Ministry
(c) Ministry of Coal
(d) Law Ministry

640. Risk assessment is possible by
(a) Identification of hazards
(b) Measurement of hazards
(c) Estimating degree of hazards
(d) All of the above

641. Risk assessment is necessary to
(a) Improve safety
(b) Improve productivity
(c) Improve efficiency
(d) All of the above

642. Risk assessment is a
(a) Tool for improving safety
(b) Tool for improving efficiency
(c) Tool for improving productivity
(d) All of the above

643. Risk management involves
(a) Identification of risk
(b) Prioritisation of risk
(c) Program for risk removal
(d) All of the above

644. Risk management is
(a) Identification of hazards
(b) Removal of hazards
(c) Priorisation hazards
(d) All of the above

ISO

645. ISO is a
(a) Un-disciplinary team
(b) It is a multi disciplinary team
(c) It is team functioning under CMD
(d) None of the above

646. ISO is an
(a) Internal organization
(b) External organization
(c) Intimation organization
(d) None of the above

647. Function of ISO is
(a) Formulation of safety policy
(b) Ensuring the exactness of safety policy
(c) Inspection to ensure that safety policy is implemented
(d) All of the above

648. The main function of ISO is
(a) To increase safety
(b) To reduce accidents
(c) To enquire into accidents
(d) All of the above

649. For an organization like Coal India head of ISO, is supposed to report directly to :
(a) Chairman CIL
(b) Director (Pers)
(c) Director(Tech.)
(d) None of the above

Safety Management

650. Safety Management System (SMS) is
(a) A plan only
(b) It is a working document for improving safety
(c) It is an action plan only
(d) It is safety inspection only

651. Workers participation in safety management is very important because
(a) They have long experience in working in mining
(b) They remain in the face for the whole shift.
(c) They have seen many happenings in the mine
(d) All of the above

652. What is Standard Operating Procedure (SOP)?
(a) It is a document stating 'to work in a safe and disciplined' manner
(b) Doing the work in quick manner
(c) Doing the work without any supervisor
(d) None of the above

653. SOP is required for
(a) Safety
(b) Efficiency
(c) Reduction of cost
(d) All of the above

Traffic Rules

654. Traffic rule is necessary for
(a) Efficient transport of material
(b) Safe transport of material
(c) Quick transport of material
(d) All of the above

655. Traffic rule is prepared by
(a) Engineer (b) Manager (c) Traffic in-charge (d) All of them

656. For Traffic Rule following points are considered
(a) Annual production of coal (b) Annual production of overburden
(c) Size and population of dumper (d) All of them

657. Traffic Rule has to be passed through
(a) DGMS (b) Dumper manufacturing company
(c) Area Office (d) None of them

658. Traffic Rule considers the following points
(a) Right of the way (b) Speed limit
(c) Parking (d) All of them

659. Parking brake is used for
(a) Keeping the dumper in non-moving condition
(b) For running of the dumper
(c) Both (a) and (b) (d) None of the above

660. Service brake is used for
(a) Normal operation of dumpers (b) Dumping purpose
(c) High speed control (d) All of the above

661. Types of brakes in a dumper are
(a) 2 (b) 3 (c) 4 (d) 5

662. Brake testing of dumper is done
(a) At the maximum gradient of the haul roak
(b) At a speed of 32 km/hr
(c) Both (a) and (b) (d) None of the above

663. Traffic Rule (TR) is prepared by
(a) Manager himself (b) Engineer
(c) By the dumper manufacturing company
(d) By a team of state govt. (transport deptt.) officers & officials in the mine headed by Manager

664. Traffic Rules are
(a) Statutory (b) Code of practice only
(c) Both of above (d) None of the above

Lighting/Illumination

665. Adequate general lighting arrangement shall be provided in every travelling roadway normally used by .....or more persons during any shift?
(a) 50 (b) 30 (c) 100 (c) 60

666. General electric lighting may be used on any other roadway or place not within atleast .....of the nearest face?
(a) 100 m (b) 200 m (c) 270 m (d) 400 m

667. Every depillaring area should be provided with general lighting by a cluster of .....cap lamps places on the suitable stand?
(a) 10 to 15 (b) 5 to 10 (c) 15 to 20 (d) 20 to 25

668. The maximum current of the fuse in cap lamp is?
(a) 3 amp (b) 2 amp (c) 4 amp (d) 5 amp

Practice :Standards of lighting

1. Standards of lighting to be provided in any underground mines is stated below :

Place	Minimum average illumination level in lumens/ft^2
Pit bottom	1.5 to 3.00
Main junctions	1.25
Haulage & travelling roadways	0.40
Haulage engine, control gear, haulage drum	1.5
Coupling & uncoupling points in the haulage road	1.5
Loading points	1.5
Conveyor belt drive heads/discharge points	1.5
Engine and motor rooms	1.5
First aid and reserve stations	1.25
In depillaring districts	
Gassy mine of Degree I	at the floor – 15
	At a distance of 6 to 7 m from depillaring area = 4x250 w cluster of lamps 6x100w
Degree II & III	15 Lux
	15 to 20 nos. of cap lamps flood-light in FLP or hermetically sealed enclosures

669. Illumination in O/C mine is necessary for

(a) Efficient working (b) Safe working
(c) Better environment (d) All of the above

670. Standard of lighting is fixed by

(a) Supervising official (b) By ventilation officer or safety officer
(c) By manager (d) By Chief Inspector of Mines

671. Adequate lighting is provided

(a) On surface at opencast mine when day light is not sufficient
(b) In underground mine all the time
(c) Standard to be decided by Chief Inspector of Mines
(d) All correct

Answer Key

1. (b)
2. (c)
3. (a)
4. (c)
5. (d)
6. (c)
7. (a)
8. (b)
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544. (c)
545. (a)
546. (b)
547. (a)
548. (a)
549. (d)
550. (a)
551. (a)
552. (a) (b) (c) (d)
553. (a)
554. (a)
555. (b)
556. (b)
557. (d)
558. (a)
559. (b)
560. (a)
561. (b)
562. (c)
563. (a)
564. (b)
565. (d)
566. (a)
567. (b)
568. (b)
569. (a)
570. (b)
571. TRUE
572. (a)
573. (b)
574. (c)
575. (a)
576. (b)
577. (b)
578. (a)
579. (a) (b)
580. (a)
581. (a)
582. (d)
583. (a)
584. (c)
585. (b)
586. (d)
587. (b)
588. (c)
589. (c)
590. (c)
591. (c)
592. (a)
593. inside and outside
594. (c)
595. (b)
596. (b)
597. (d)
598. (c)
599. (a)
600. (a)
601. (d)
602. (e)
603. (a)
604. (d)
605. (d)
606. (d)
607. (d)
608. (d)
609. (b)
610. (a)
611. (a)
612. (b)
613. (c)
614. (a)
615. (b)
616. (d)
617. (c)
618. (d)
619. (a)
620. (d)
621. (d)
622. (b)
623. (d)
624. (a)
625. (c)
626. (b)
627. (b)
628. (b)
629. (a)
630. (a)
631. (b)
632. (c)
633. (d)
634. Ans : (i) + (c), (ii)+(d), (iii)+(e), (iv)+(a), (v)+(b)
635. (b)
636. (c)
637. (a)
638. (a)
639. (b)
640. (d)
641. (d)
642. (d)
643. (d)
644. (d)
645. (b)
646. (a)
647. (d)
648. (d)
649. (a)
650. (b)
651. (d)
652. (a)
653. (d)
654. (d)
655. (d)
656. (d)
657. (d)
658. (d)
659. (a)
660. (a)
661. (d)
662. (c)
663. (d)
664. (b)
665. (a)
666. (c)
667. (c)
668. (c)
669. (d)
670. (d)
671. (d)

Chapter 7

Use of Electricity in Mines

1. **Maximum Voltage limits for apparatus/equipment as per provisions of CEA(Central Electricity Authority(Reg. 102) –**

Match A the list of apparatus/equipment	with Maxm. Voltage Limits (in B)
(A) Hand-held portable apparatus	(P) 250 V
(B) Electric lighting (mid-point or natural shall be connected with earth) Underground Mines(phase to phase)	(Q) 125 V
(C) Electric lighting (mid-point or natural shall be connected with earth) Opencast mines & surface of the mine	(R) 650 V
(D) Portable hand lamps UG	(S) 125 V
(E) Circuit for Remote Control or Interlocking of apparatus	(T) 30V
(F) In fixed plants if bolted type plug is used	(U) 30V

2. **In sub-stations the equipments are kept –**
   (a) Anywhere in the room
   (b) In orderly manner in separate room/compartment or box
   (c) In the space between separate room/compartment or box
   (d) None of the above

3. **All instruments in a sub-station be kept –**
   (a) Open (b) Duly protected
   (c) Easy to access for operate and maintain/repair and suitably covered
   (d) None of the above

4. **Isolation and fixing of transformer switchgear etc.**
   (a) Construction of separate room compartment or boxes
   (b) Such room compartment or boxes shall be fire proof in nature
   (c) They shall be kept dry, illuminated and adequately ventilated
   (d) All the above

5. **Flexible cable shall be used for**
   (a) Portable & transportable apparatus (b) Fixed apparatus
   (c) both (a) & (b) (d) None of the above

6. **Flexible cable must have flexible armouring if –**
   (a) Voltage 250 V (b) > 250V (c) Connected to earth
   (d) Conductivity < 25% of largest conductor (e) All the above

7. **Flexible cable should be –**
   (a) Provided with an anchor at machine end
   (b) Provided a circuit breaker when it is connected to armoured cable supplying power
   (c) To be examined at least once every shift by an electrician and the machine operator as often as possible
   (d) All the above

8. **The flexible cable shall be connected to the machine by**
   (a) Bolted type connector (b) Inter locked to the power supply
   (c) both (a) and (b) (d) Any one of the above

9. **Flexible cable may have –**
   (a) Single core (b) Double core
   (d) Multi core (d) all the above

10. **Flexible cables are usually having-**
    (a) and a pilot core (b) 1 earth core only with a power core
    (c) 1 pilot core only with 2 power cores (d) All of the above

11. **As per IER, the length of flexible cable used in portable and transportable apparatus shall not be more than**
    (a) 50 m (b) 100 m (c) 200 m (d) 300 m

12. **In underground mines the length of flexible cable with portable or transportable apparatus shall not ordinarily exceed ..... m.**
    (a) 100m. (b) 125m. (c) 150m. (d) 200 m

13. **In underground mine having Long Wall or shuttle car , LHD operation the length of flexible cable may be upto:**
    (a) 300m. (b) 250m. (c) 300m. (d) None of these

14. **For HEMM the length of flexible cable may be up to ..... m.**

15. For bucket wheel excavator length of flexible cable up to ..... m for 11 KV supply.

16. Flexible cable shall be inspected –
(a) Once in every shifty by the electrician
(b) By the machine operator at regular intervals
(c) All the above

17. The methods of connecting neutral to the earth is –
(a) Solidly earthed (b) Insulated earthed
(c) Restricted earthed (d) All the above

18. Which of the following is related to 'insulated earth system' :
(a) Mid point connected to earth
(b) Mid point not connected to earth
(c) Mid point connected to earth with some resistance
(d) Equipments with sensors

19. Use of power in a mine shall be at a voltage of
(a) not more than 6600V (b) > 6600V
(c) both (a) and (b) (d) None of the above

20. Supply voltage to mine may be
(a) not more than 11000V (b) > 11000V (c) None

21. Supply voltage to a mine may be –
(a) 200 KV (b) 132 KV (c) 6.6KV (d) 33 KV (e) None

22. Clearance of overhead (OH) line with the ground should be –
(a) at least 4m (b) at least 4.6m (c) at least 5.5m (d) all the above

23. Clearance of lowest conductor over haul road should be
(a) at least 12m (b) at least 10m (c) at least 15m (d) None of the above

24. The voltage system in interlocking system may be –
(a) 250V (b) 125V (c) 30V (d) None of these

25. In I.S.circuit the energy of making & breaking of the circuit is absorbed by –
(a) Resistor (b) Capacitor (c) Inductor (d) All the above

26. Where the telephones or electrical signals are provided, the signal wires shall be supported on insulators and shall not be energized at more than
(a) 20 V (b) 30 V (c) 60 V (d) 125 V

27. As per Indian Electricity Rules, where hand-held portable apparatus is used, the voltage should not exceed
(a) 30 V (b) 75 V (c) 125 V (d) 250 V

28. The maximum voltage of electrical signals in underground mines having supported on insulators is
(a) 30 V (b) 60 V (c) 125 V (d) 220 V

29. In Deg-II gassy mines all apparatus shall be flameproof up to ..... of working face or goaf or in bye of LVC or in the return airway.

30. In Deg-I gassy seam all cable shall be constructed, installed, protected, operated and maintained in such a manner as to prevent .....

31. As per the recent amendment CEA, 2010 appropriate resistance is to be inserted between the natural point of the transformer and the earthing system. It has now to be ..... to limit the earth fault.

32. In case of mines, minimum clearance above ground of the lowest conductor of over-head lines or over-head cables, where dumpers or trackless vehicles are being operated shall not be less than ..... in height from the ground across the road where dumpers of trackless vehicles cross.

33. The supply voltage for electric L.H.D. is
(a) 110V (b) 220V (c) 440V (d) 1100V

34. In coal seam of any degree of gassiness if the inflammable gas in the general body of air exceeds .....% power shall be immediately disconnected from all cables and apparatus in the area
(a) 0.75 (b) 1.00 (c) 1.25
(d) 1.50

35. In Deg-III gassy seam all apparatus shall be flameproof within the range of .....m. of working face or goaf, or in bye of LVC, or in a return airway.
(a) 90 (b) 180 (c) 270 (d) 300

36. In U/G mines, setting of the relay would be of the order of 80 to 100 millamps (mA) with clearance times of ..... for gate ends boxes 7 the switchgears controlling drill panels.

(a) <600 ms (b) < 400 ms (c) < 200 ms (d) None of these

37. In case of O/C mines, tapping value of earth leakage/fault relays is set between ..... amperes.
(a) 1-2 (b) 2-4 (c) 2-5 (d) 2-6

Answer Key

1. Ans : (A)+(Q), (B)+(S) or (Q); (C)+(Q) or (S); (D)+(T) or (U); ~~(E)+(D)+(T);~~ (F)+(R)
2. (c)
3. (c)
4. (d)
5. (a)
6. (e)
7. (d)
8. (d)
9. (d)
10. (a)
11. (b)
12. (a)
13. (b)
14. 300m
15. 1000 m
16. (c)
17. (c
18. (c)
19. (a)
20. (a)
21. (e)
22. (d)
23. (a)
24. (c)
25. (d)
26. (c)
27. (a)
28. 90m.
29. Open sparking
30. Restricted earth neutral system
31. 12m.
32. (d)
33. (c)
34. (c)
35. (c)
36. (c)
37. (a)

Chapter 8

Mine Gases & Gas Testing

1. What is the minimum percentage of Oxygen to be required at any place inside the mine where persons are required to work and make movements.

(a)19.8% (b)19.6% (c)19.4% (d) 19.0%

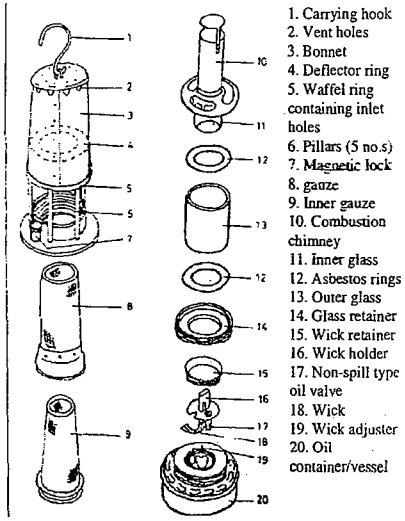
2. What should be the speed of air current when the Wet Bulb Temp. exceeds 30.5 ° C

(a) 0.7 m/sec (b) 0.5 m/sec (c)~~0.8~~ m/sec (d) 1.0 m/sec

3. Link Impurities in mine airways at (A) with Gases/Particles at (B)

Impurities in mine airways at (A)	Gases at (B)
(i) Non-toxic gases	(a) Carbon monoxide
(ii) Mild-toxic gases	(b) Hydrogen
(iii) Liquid droplets	(c) Water particles
(iv) Toxic gases	(d) Carbon dioxide

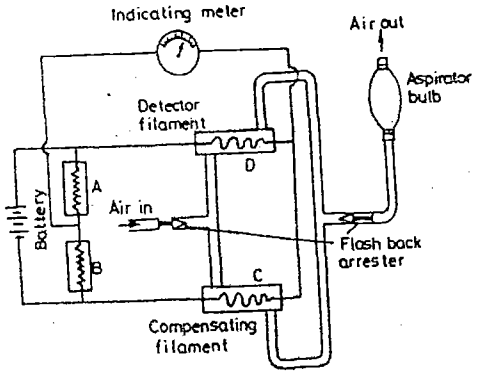
4. Arrange the following parts of a flame safety lamp from bottom to top :



1. Carrying hook
2. Vent holes
3. Bonnet
4. Deflector ring
5. Waffel ring containing inlet holes
6. Pillars (5 no.s)
7. Magnetic lock
8. gauze
9. Inner gauze
10. Combustion chimney
11. Inner glass
12. Asbestos rings
13. Outer glass
14. Glass retainer
15. Wick retainer
16. Wick holder
17. Non-spill type oil valve
18. Wick
19. Wick adjuster
20. Oil container/vessel

(a) Oil vessel
(b) Outer Glass
(c) Wick retainer and wick holder
(d) Magnetic lock

4. (b) Study the Schematic diagram of MSA D6 Methanometer



3. **Flame Safety Lamp is also known as**
(a) DGMS Safety Lamp (b) Davy's Safety Lamp
(c) Mark's Safety Lamp (d) None of the above

4. **DGMS has approved this type for coal mines of all degrees of gassiness**
(a) Velox GL-5 (b) Velox GL-60 (c) Velox GL-10 (d) None of the above

5. **This oil is used in flame safety lamps, in line with DGMS approval :**
(a) Kerosene oil (b) Only petrol
(c) Petrol and kerosene mix (d) ESSO Solvent BP 1425

6. **This is not a safety feature of a flame safety lamp :**
(a) Spring loaded non-spill type oil valve (b) Asbestos ring packings
(c) Magnetic lock (d) Kerosene oil of approved type

7. **Re-arrange the normal flame of a flame safety lamp from wick towards top:**
(a) Intermediate zone of in-complete combustion
(b) Outer zone of complete combustion
(c) Inner zone of non-combustion

8. **Write the colour of the following zones of a flame safety lamp:**
(a) Intermediate zone of in-complete combustion
(b) Outer zone of complete combustion
(c) Inner zone of non-combustion

9. **In the Accumulation Test 'jumping' of flame gives a positive response indicagting and accumulation of gas not less than 3 %.**
Tue/False

10. **In the accumulation test the higher percentage of methane (but less than lower flammable limit) the products-of-combustion will, in all probability, ... the flame.**

11. **Match the methane concentration at (A) with approximate height of the cap(B):**

Methane concentration at (A)	Approximate height of the cap
(a) 1.5%	i) 8mm
(b) 2.0%	ii) 6 mm
(c) 2.5%	iii) 4 mm
(d) 3.0%	iv) 12 mm

12. **While using in the suspected place of mine gallery the flame safety lamp with normal flame is ..... towards the roof and the change in the flame, if any, is observed.**

15. The limits of explosibility of Methane is explained in this diagram
(a) Coward (b) Grahams (c) Le Chetelier (d) None of the above

16. **The following equation explains the explosibility of a mixture of combustible gases**
(a) Pythagorus equation (b) Le Chetelier equation
(c) Simon's equation (d) None of the above

17. **At what percentage of CO2 safety lamp begins to die down ?**
(a) 3.0 (b) 1.0 (c) 0.5 (d) 0.1

18. **The methane air mixture become explosive with this minimum percentage of Oxygen**
(a) 12% (b) 8% (c) 10% (d) 14%

19. **To make it an explosive, in which range of methane air mixture falls:**
(a) 4.2 to 8.4 (b) 5.4 to 14.8 (c) 7.4 to 8.4 (d) 10 to 18

20. **Blackdamp composition is –**
(a) $CO + CO_2$ (b) $CO_2 + N_2$ (c) $CH_4 + H_20$ (d) $CO + CH_4$

21. **Fire damp is composed of**
(a) CO_2 (b) CO (c) CH_4 (d) N_2

22. **Stink damp relates to –**
(a) H_2S (b) CH_4 (c) NO_2 (d) SO_2

23. **Name the gas which is not very dangerous –**
(a) Methane (b) Carbon Monoxide
(c) Carbon Dioxide (d) Sulfur Dioxide

24. **The delay between ignition and source of heat is known as :**
(a) Lag of ignition (b) Incubation period
(c) Saturation (d) Thermal conductivity

25. **When Methane burns in air this produces**
(a) $CO + CO_2$ (b) $CO_2 + H_2O$ (c) $CH_4 + H_20$ (d) $CO + CH_4$

26. **CO_2 is best suited for extinguisher**
(a) Class A fire (b) Class B fire (c) Class C fire (d) All fires

27. **In the event of a Down cast shaft fire on fire in the vicinity of the main intake airway, reversal of ventilation helps to :**
(a) In preventing the smoke and fumes from reaching the working faces
(b) In resulting in the opening the separation doors between DC(down cast) & UC(up cast) shafts
(c) It may cause movement of large volume of gas from the goaves and old mine workings to the main intake airways.
(d) None of the above

28. **While analysing the mine air sample the following percentage were recorded–**
Oxygen = 19.11, Nitrogen=79.04, Carbon Dioxide = 0.25,
Carbon Mono-oxide=0.02 Methane=1.58.
Find the percentage of Blackdamp:
(a) 6.1 (b)7.1 (c) 8.1 (d) 9.1

29. **To control or combat fire or spontaneous heating in a goaf the following gas is introduced –**
(a) SO_2 (b) H_2 (c) CO_2 (d) N_2

30. **The plates of the Oldham Cap Lamp Battery is immersed a solution. What is the composition of this solution:**
(a) $HNO_3 + HCL$ (b) $HCL + H_2O$
(c) H_2SO_4 + Distilled water (d) Lead acid solution

31. **The Cap lamp used by the miners is**
(a) Intrinsically safe (b) Flame proof
(c) Neither Intrinsically safe nor flame proof (d) None of the above

32. **Cap lamps should have this safety feature**
(a) Arrangement to restrict excessive current flow in the event of short-circuit
(b) Cartridge type silver fuse is placed
(c) Both the above safety features
(d) None of the above

33. **When we go for testing by flame safety lamp, the percentage of gas present in the mine air is indicated by**
(a) Colour of the wick (b) Light emitted by the lamp
(c) Height of the cap (d) Type of fuel used

34. **What is the minimum percentage of Methane concentration a cap lamp can measure**
(a) 0.5 5 (b) 1.0% (c) 1.5% (d) 3.0%

35. **Before the 'cap test' with the cap lamp, which test is carried out:**
(a) Ignition (b) accumulation (c) loop test (d) sensitivity test

35. **In the mine air when hot and humid conditions takes place, more amount of blood is supplied to the skin and cardiac out put increases which may result–**
(a) High blood circulation (b) High blood pressure
(c) Cardiac failure (d) Skin becomes hot

36. **How the underground mine environment is influenced with emission of Methane–**
(a) Total volume of the air in the mine increase
(b) Percentage of toxic gases reduces
(c) Reduces the density of return air thereby aids in Natural Ventilation
(d) Increases the percentage of Oxygen in the mining district

37. **'Lower limit of inflammability of Methane' is expressed as the percentage of methane in a methane-air mixture that is sufficient to allow a flame to pass slowly and completely through the mixture. This is approximately ...**
(a) 3% (b) 5% (c)8% (d) 10%

38. **'Upper limit of inflammability of Methane' is the limit above which there will be so much methane present, that the amount of Oxygen will be reduced to the extent which will not allow the flame to propagate through the mixture.This is approximately ...**
(a) 9% (b) 15% (c)8% (d) 10%

39. **Lag of ignition –**
(a) The period depends upon the initial temperature
(b) The period depends upon character of igniting source
(c) Source of heat
(d) All the above are correct

40. **What will be the effect is a flame is introduced in a methane-air mixture having percentage of methane below its lower limit of inflammability ?**
(a) Methane gas will continue to burn
(b) Methane gas will continue to burn only adjacent to the flame
(c) Similar to the way it burns inside a flame safety lamp when the lamp is taken to an atmosphere containing 1% methane
(d) All the above are true.

41. **Calculate the percentage saturation of mine air, in the absence of a Hygrometric Table.**
(a) For a dry bulb temperature between 10 & 18^0 C,
(b) Dry-bulb temperature of more than 18^0 C and less than 27^0 C

42. **Methane can form a layer along the floor of workings, if the density of the gas mixture is more than :**
(a) 0.2 % (b) 0. 4% (c) 0.6% (d) 1.0%.

Answer Key

1. (d) 19.0%
2. (d) 1.0 m/sec
3. (i) + (b) ; (ii) + (d); (iii) + (c) ; (iv) + (a)
4. -a), c), b), & d)
5. (b)
6. (b)
7. (d)
8. (d)
9. ( )
10. (a) White (or yellowish) (b) Non-luminous (c) Blue colour
11. Ans: TRUE
12. Ans: EXTINGUISH
13. (a) + (iii), (b) + (ii), (c) + (i) & (d) + (iv)
14. gradually raised
15. (a)
16. (b)
17. (a)
18. (a)
19. (b)
20. (b)
21. (c)
22. (a)
23. (d)
24. (a)
25. (b)
26. (c)
27. (a)
28. (b)
29. (d)
30. (c)
31. (c)
32. (c)
33. (c)
34. (c)
35. (b)
35. (c)
36. (c)
37. (b)
38. (b) 15%
39. (d) All the above are correct
40. (d) All the above are true.
41. Deduct 11.5% for every degree difference between the readings of dry and wetb u l b temperature, and deduct 10% for every degree difference between the readings of dry and wet bulb temperature when it is more than 180 C.
Thus, Dry bulb temperature = 20.50 C
For Wet Bulb temperature = 18.30 C
Difference is 20.50 C - 18.30 C = 2.20 C
Saturation = 100 – (2.2 x 10.0) = 78%.
42. (d) 1.0%.

Reference

DGMS (Tech) Circular No. 05 Dhanbad, Dated 21st June, 2005
To
All Owners /Agents/ Managers of all mines

Sub: Use of approved type of fuel in Velox - GL 7 and GL 50 Safety lamps

Velox - GL 7 and GL 50 flame safety lamps manufactured by M/s J K Dey and Sons have been approved by DGMS for detection and measurement of inflammable gas and deficiency of oxygen in mine atmosphere. One of the conditions of approval is that no fuel other than ESSO Solvent BP 1425 or its equivalent or motor spirit shall be used in the lamp.

It has been observed in most of the mines kerosene oil is being used as fuel in the lamp leading to poor flame which can lead to error in detection of gas. With use of ESSO Solvent BP 1425, or it's equivalent or motor spirit, instead of kerosene:

(i) a steady flame is observed;
(ii) testing flame can be easily seen;
(iii) length of flame varies sharply with varying percentage of inflammable gas; and
(iv) as the fuel is highly volatile with low flash point and less viscosity the relighting mechanism of GL 7 lamp works smoothly,

Use of kerosene oil as fuel also causes the cotton absorbent inside the oil vessel of flame safety lamp to solidify within a year or so, making it inactive to absorb any further oil which results in spillage of oil, low duration of flame and improper formation of testing flame. A steady flame is not formed and the flame gets extinguished with slight jerk, the oil vessel becomes hot, and the gas cap may not be formed at all.

A study was also carried out in CMRI, Dhanbad with three types of fuel namely ESSO Solvent 1425, petrol and kerosene. The report also confirms that the length of the blue flame in different percentage of inflammable gas is least when kerosene is used.

Therefore may I request all concerned not to use any fuel other than ESSO Solvent BP 1425 or its equivalent or motor spirit in the Velox - GL 7 and GL 50 Safety lamps for effective functioning of the flame safety lamps in mines.

Yours faithfully

sd/-
(Bhaskar Bhattacharjee)
Director General of Mines Safety

Chapter 9

Mining Environment/Mine Ventilation

General Mine Air & Gases

1. **In the Coward flammability diagram, the respective percentages of methane and oxygen at the nose limit are**
(a) 14.2, 0.0 (b) 14.1, 18.2 (c) 5.8, 12.1 (d) 5.0, 19.2

2. **A mine worker inhales normal air; whereas, the exhaled air contains 16.65% O_2 and 3.83% CO_2. The respiratory quotient of breathing for the worker is**
(a) 0.23 (b) 0.89 (c) 0.99 (d) 1.13

3. **Flame safety lamp is used for testing**
(a) CO (b) CO_2 (c) CH_4 (d) H_2S

4. **Incubation period is NOT related to**
(a) crossing point temperature of coal (b) panel size
(c) seam thickness (d) explosibility of coal dust

5. **In an experiment to study coal dust explosibility, it is found that at least 3.0 g of limestone dust should be added to a sample of 2.0 g of coal dust to ensure that propagation of flame does not take place. The explosibility factor of coal dust is**
(a) 60.00 (b) 20.00 (c) 6.70 (d) 1.50

6. **The pressure on a phreatic surface is**
(a) less than atmospheric pressure (b)greater than atmospheric pressure
(c) equal to atmospheric pressure (d) independent of atmospheric pressure

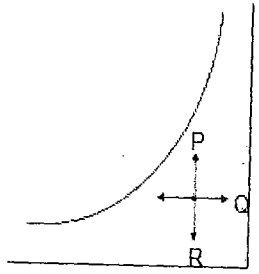
7. **Incubation period is NOT related to**
(a) crossing point temperature of coal (b) panel size
(c) seam thickness (d) explosibility of coal dust

8. **Bypass valve in a compressed oxygen type self-contained breathing apparatus is meant to**
(a) release accumulated nitrogen in the breathing bag
(b) release excess pressure in the breathing bag
(c) supply oxygen directly to wearer in case pressure reducing valve does not function
(d) flush out the apparatus with oxygen on opening the cylinder valve

9. **In an experiment to study coal dust explosibility, it is found that at least 3.0 g of limestone dust should be added to a sample of 2.0 g of coal dust to ensure that propagation of flame does not take place. The explosibility factor of coal dust is**
(a) 60.00 (b) 20.00 (c) 6.70 (d) 1.50

9. **A mine worker inhales normal air; whereas, the exhaled air contains 16.65% O2 and 3.83% CO_2. The respiratory quotient of breathing for the worker is**
(a) 0.23 (b) 0.89 (b) 0.99 (b) 1.13

11. **Four psychrometric processes P, Q, R and S are shown in the psychrometric chart below.**



These processes respectively represent
(a) dehumidification, humidification, sensible heating, sensible cooling
(b) sensible heating, humidification, dehumidification, sensible cooling
(c) dehumidification, sensible heating, sensible cooling, humidification
(d) humidification, sensible heating, dehumidification, sensible cooling

12. **Match the following in the context of underground mine environment**

Instrument	**Measurin parameter**
P. Heldene apparatus	I. Humidity
Q. Godbert-Greenwald apparatus	II. Air velocity
R. Hygrometer	III. Mine air composition
S. Anemometer	IV. Ignition point temperature

(a) P-II, Q-I, R-III, S-IV (b) P-III, Q-IV, R-I, S-II
(c) P-IV, Q-II, R-III, S-I (d) P-I, Q-III, R-IV, S-II

13. **What is the minimum size of coal pillar when the depth of coal seam from surface remains between 240m to 360m and gallery width does not exceed 3m?**
(a) 28 m (b) 28.5 m (c) 30 m (d) 30.5 m

14. **Based on the manpower, what should be the quantity of air supposed to flow through the in bye most galleries?**
(a) 3 m^3/min (b) 6 m^3/min (c) 9 m^3/min (d) 12 m^3/min

15. **This term refers to human tolerance of high wet bulb temperature**
(a) acclimatization (b) saturation (c) asphyxia (d) radiation

16. **At what percentage of Oxygen level, a person will face instant loss of sense?**
(a) 15 (b) 12 (c) 10 (d) 7

17. **Exhaust gases of varied concentration is produced by the IC engine of a Locon. Find the concentration level of CO in the exhaust gas?**
(a) 10 – 20 ppm (b) 50 60 ppm
(c) 100 – 200 ppm (d) 201 – 400 ppm

18. **By burning 1 Kg of coal dust (having 75% carbon), how much CO will be produced ?**
(a) 0.5 cum (b) 0.75 cum (c) 1.0 cum (d) 1.5 cum

19. **H_2S in a mine will not be formed because of –**
(a) decay of timber (b) spontaneous combustion of coal
(c) spreading of coal dust (d) burning of blasting fuse

20. **When Methane is burnt two gases are formed with a blue flame. Name the gases –**
(a) $CO_2 + CO$ (b) $CO_2 + H_2O$ (c) $CO_2 + N_2$ (d) $CO_2 + CH_4$

21. **Lag on ignition of CH_4 is due to :**
(a) It takes the time of absorption of N_2
(b) It starts dissociating and burns only after absorbing a certain quantity of heat
(c) It depends on its maximum saturation
(d) None of the above

22. **Firedamp or methane is generally found in**
(a) metal mines
(b) coal mines or tunnel passing through carbonaceous shale
(c) in pond
(d) in general atmosphere

23. **Under which conditions, rate of methane gas emission is released –**
(a) coal permeability (b) depth
(c) width of working (d) method of working

24. **At 273.15 K (0°C)the enthalpy of Air will be –**
(a) 0 (b) 1 (c) 2 (d) 3

25. **A miner when doing hard work at 307 K may sweat at the rate of**
(a) 120 cm^3 per hr (b) 350 cm^3 per hr
(c) 550 cm^3 per hr (d) 850 cm^3 per hr

26. **What is the loss of sodium chloride in 100 cm3 of sweats?**
(a) 0.1 g (b) 0.5 g (c) 1 g (d) 5 g

27. **It gives the assessment of cooling power of the environment irrespective of the working rate of men. This is known as**
(a) kata estimation (b) effective temperature
(c) dry bulb temperature (d) sweat rate

28. **The maximum rate of heat transfer from 1m2 of the human body surface to the surrounding air under any environmental condition is called**
(a) specific heat of air (b) specific cooling power
(c) predicted sweat rate (d) metabolic rate

29. **During hard work e.g. shoveling, tramming, the metabolic heat rate (W m^{-2}) from the body surface of an average is in the range of**
(a) 90 (b) 150 (c) 200 (d) 270

30. **What do you mean by gauage pressure?**
(a) difference between absolute pressure and atmospheric pressure
(b) static pressure plus velocity pressure
(c) barometric pressure
(d) absolute pressure only

31. **Sum of static pressure and velocity pressure is known as**
(a) atmospheric pressure (b) absolute pressure
(c) gauge pressure (d) total pressure

32. **The pressure inside a sealed vessel shown by a manometer is called**
(a) velocity pressure (b) static pressure
(c) barometric pressure (d) mean atmospheric pressure

33. **Creep is the error associated with**
(a) fortin barometer (b) manometer
(c) aneroid barometer (d) mercury barometer

34. **Can you guess on the geothermic gradient for Indian coalifelds?**
(a) 1K / 11 m (b) 1K / 18 m (c) 1K / 28.4 m (d) 1K / 38.4 m

35. **The frictional heat produced by the haulage in the mine can be diverted by**
(a) a forcing fan (b) an exhaust fan
(c) installing haulages in return (d) reducing the speed

36. **Major source of heat in underground coal mines is**
(a) from lights (b) from men
(c) due to oxidation (d) from machinery

37. **The fall of 0.1% of O_2 in the air between intake and return airways produces enough heat to raise air temperature by**
(a) 1 K (b) 7 K (c) 15 K (d) 30 K

38. **What is the range of heat produced due to oxidation of coal?**
(a) 1.7 MJ m^{-3} (b) 3.79 MJ m^{-3} (c) 5.79 MJ m^{-3} (d) 8.79 MJ m^{-3}

39. **Given the following,**

Equation/formula/law	**Application**
P.Bernoulli equation	1.Pressure loss in laminar flow of fluid
Q.Poiseuille equation	2.Drag loss due to regular obstructions in fluid flow
R.Bromilow's formula	3.Energy conservation in ideal fluid flow
S.Stokes law	4.Terminal settling velocity of fine particles in fluid

the correct match is
(a) P-3, Q-1, R-2, S-4 (b) P-1, Q-3, R-2, S-4
(c) P-2, Q-3, R-4, S-1 (d) P-3, Q-1, R-4, S-2

40. **Which Law explains, about fluid flow..**
(a) Kirchoff's Law (b) Bernouilli's Theorem
(c) Graham's Law of diffusion (d) Charles Law

41. **The volume of a given mass of gas varies inversely as the absolute pressure if the temperature remains constant. Name the Law –**
(a) Charles Law (b) Kirchoff's Law (c) Boyle's Law (d) Graham's Law

42. **This is not a function of Thermal Emmisivity.**
(a) moisture content (b) temperature
(c) rock surface (d) rock weatherability

43. **Heat is produced by human being through the process of ..... .**
(a) metabolism (b) acclimatization
(c) salt depletion (d) dehydration

44. **Find the height of motive column? When, the temperatures in up cast shaft & downcast shaft are 40°C & 30°C respectively and the Shaft is 350 m deep.**
(a) 9 (b) 11 (c) 13 (d) 15

45. **Find out the NVP, when the height of motive column is 12 m & density of air in Downcast shaft is 1.2 Kg/m^3.**
(a) 10 (b) 10.8 (c) 13.2 (d) 14.4

46. **It is the equation which gives the estimate of the pressure drop for laminar flow of viscous fluids through pipes. Name the equation**
(a) Kinematic viscosity equation (b) Poiseuille eqation
(c) Bernoulli's equation (d) Karman resistance equation

47. **It is the ratio of the power actually absorbed by the impeller and converted into the head of the power applied to the shaft**
(a) volumetric efficiency (b) static efficiency
(c) total efficiency (d) mechanical efficiency

48. **Natural ventilation can be caused by**
(a) Auto-compression in downcast shaft
(b) differences in air densities in upcast and downcast shafts
(c) auto-expansion in upcast shaft
(d) moisture content in the mine

49. **If the mean barometric pressure of the downcast air column is higher than that of the upcast air column then what will happen?**
(a) there is no flow of air in the mine
(b) maximum leakage of air in the district
(c) it will help natural ventilation
(d) it will create differences in air densities

50. **How does the circulation of refrigerated air through the downcast shaft aiding the natural ventilation?**
(a) increasing the density in upcast shaft
(b) reducing the density in upcast shaft
(c) increasing the density in downcast shaft
(d) reducing the density in downcast shaft

51. **Which of the following ventilation system is adopted for continuous miner headings?**
(a) duct less auxiliary ventilation (b) overlap system of ventilation
(c) exhaust type of ventilation without ducting (d) forcing type of ventilation

52. **How can you reduce the resistance developed in a ventilation duct?**
(a) by using a duct of very high length
(b) by using a duct having corrugated internal surface
(c) using a large-diameter duct
(d) increasing the flow of air through the duct

53. **As per national coal board, UK recommendation, what should be the diameter of duct to be used for a distance beyond 900m?**
(a) 250 mm (b) 400 mm (c) 500 mm (d) > 600 mm

54. **Ventilation survey means**
(a) quantity survey of air in the mine (b) quantity survey in the mine
(c) both quantity and pressure survey in the mine
(d) pressure survey in the mine

55. **For calculating velocity of air in underground, this method is adopted?**
(a) smoke-cloud method (b) pulsed infusion method
(c) optical method (d) inertial precipitation method

56. **What is the nature of flow of air in mines?**
(a) laminar (b) turbulent (c) circular (d) smooth conduits

57. **What is the pressure required to circulate 18m^3 of air per second, through an underground coal mine airway 260m long, 3m high and 2.5m wide? The coefficient of friction of the airway is 0.01 N s2 m^{-4}.**
(a) 25.7 Pa (b) 35.7 Pa (c) 45.7 Pa (d) 55.7 Pa

58. **A smooth steel duct 450 x 600 mm in size circulate 0.5 m^3 of air per second. Calculate the coefficient of resistance of the duct?**
(a) 125 Pa (b) 225 Pa (c) 300 Pa (d) 375 Pa

59. **A mine airway 2m wide, 2.5m high and 500m long. The airway passes a quantity of 8 m^3 per second. Calculate its pressure loss? Assume k = 0.0098 N s^2 m^{-4}**
(a) 11 Pa (b) 21 Pa (c) 31 Pa (d) 50 Pa

60. **What do you understand by power of ventilation?**
(a) leakage of ventilation path
(b) air flow through a duct of varying cross-section
(c) size of regulators
(d) rate at which work is done to maintain the air flow through a system

61. **By reducing the resistance of an air way we can improve the ventilatio efficiency. What else can also be achieved?**
(a) interest charges on the capital cost
(b) increasing the total quantity of air entering the mine
(c) reduction of power cost of ventilation
(d) minimization of leakages

62. **A district is supplied by a main intake and a main return airway running sid by side at a distance of 30m and interconnected at 50m intervals. The stopping in the interconnections allows some leakages so that the quantities measure at inbye and outbye ends of the main intake are 5 and 7.5 m^3 s^{-1} respectively Calculate the pressure across the main intake, main return and working distric are 7.5, 7 and 0.5 N s^2 m^{-8} respectively.**
(a) 556 Pa (b) 565 Pa (c) 456 Pa (d) 465 Pa

63. **A 5m long duct of 500mm diameter is closed at both ends and pressurized b compressed-air to a gauge pressure of 500 Pa. The pressure fell to 250 P after 20 seconds. Calculate the rate of leakage while barometric pressure i 101 kPa.**
(a) 0.0001 m^3 s^{-1} (b) 0.00015 m^3 s^{-1}
(c) 0.0002 m^3 s^{-1} (d) 0.00025 m^3 s^{-1}

64. **Given the following,**

Rescue apparatus	**Characteristic**
P.Draeger BG-4	1.Open circuit chemical oxygen self-rescuer
Q.MSA IW-65	2.Filter type self-rescuer
R.Draeger Pulmotor	3.Self-contained breathing apparatus
S.Oxyboks	4.Resuscitation apparatus

the correct match is
(a) P-3, Q-2, R-1, S-4 (b) P-4, Q-1, R-2, S-3
(c) P-3, Q-2, R-4, S-1 (d) P-1, Q-4, R-3, S-2

65. **Kata thermometer is used to measure**
(a) wet bulb temperature (b) dry bulb temperature
(c) cooling time (d) heat convection

66. **This is the temperature developed by Yeglou to combine DB, WB, air velocity to a thermo-equivalent condition of still, saturated air**
(a) globe temperature (b) effective temperature
(c) room temperature (d) deep body temperature

67. **It is a physiological index of comfort under certain environment developed by medical research of Britain**
(a) cooling power (b) P4SR (c) WBGT (d) cooling load

68. **Instrument that works on tyndall effect and comprises of a collimated beam of near-infra red light passing through a dust chamber. Name the instrument**
(a) tyndalloscope (b) simslin
(c) holographic counter (d) royco particle counter

69. **Hygrometric survey is carried out to check and control environmental conditions in mines. This is done by**
(a) whirling hygrometer (b) assman psychometer
(c) fixed hygrometer (d) manometer

70. **To determine the average velocity of air, how the anemometer is used ?**
(a) Anemometer should be moved throughout the cross section of the roadway
(b) It is kept at the roof of the gallery
(c) It is laid at the floor of the roadway
(d) It is moved along a straight line

71. **A standard pitot-static tube placed at the centre of 500 mm diameter circular duct records a velocity pressure of 300 Pa. Calculate the quantity of air flowing in the duct if the air temperature 301 K and density of air 1.2 kg m^{-3}. Assume the air to be dry and the method factor is 0.8.**
(a) 3 m^3 / s (b) 3.5 m^3 / s (c) 4 m^3 /s (d) 4.5 m^3 / s

72. **This is a highly accurate and time consuming method of measuring air velocity by anemometers and generally confined to measuring in major airways only**
(a) continuous traversing (b) precise traversing
(c) single point measurement (d) measurement at the centre of the location

73. **The method factor for anemometer reading in duct varies with the**
(a) roughness of the side of the airway and the reynold's number
(b) length of the duct
(c) velocity of air flowing through the duct
(d) quantity of air flowing through the duct

74. **In which colliery, Methane drainage was first attempted?**
(a) Ruhr Coalfield of Germany (b) Amlabed Colliery of India
(c) Santa Lucia mine of Spain (d) Lorraine Coal field of France

75. **Four underground roadways in parallel spread from a point near the bottom of a DC shaft & join at a point near the bottom of UG shaft. The parallel roadways have resistance of 9, 16, 25, 36 Kilomurg respectively. The resistance of the fan drift is 1.5 Kilomurg, whereas for DC shaft & UC shaft if is 2 & 2.5 Kilomurg respectively. Calculate the combined resistance of the whole mine**
(a) 6.1 Kilomurg (b) 7.1 Kilomurg (c) 8.1 Kilomurg (d) 9.1 Kilomurg

76. **The quantity of air going down the DC district is 850 m^3/min. The surface ventilator develops water gauge of 45 mm when the ventilator is stopped the air going down the shaft is 280 m^3/min. What is the NVP?**
(a) 5.5 mm of w.g (b) 6.5 mm of w.g (c) 7.5 mm of w.g (d) 10 mm of w.g

77. **What should be the minimum quantity of air to be circulated along a long wall face at its maximum span of 6m for a 2.5m thick gassy seam of 2nd degree?**
(a) 600 m^3/min (b) 750 m^3/min (c) 900 m^3/min (d) 1200 m^3/min

78. **What minimum quantity of air required to be circulated along the last ventilation connection in the gassy seam 2nd degree having ventilating connection (4.2m x 3m) in a district where 120 persons are employed on the largest shift and producing 360 tonnes of coal per day?**
(a) 800 m^3/min (b) 900 m^3/min (c) 1000 m^3/min (d) 1200 m^3/min

79. **What should be minimum quantity of air to be circulated along a long wall face at its maximum speed of 7.5 m for a 3 m thick gassy seam of 3rd degree?**
(a) 989.5 m^3/min (b) 1447.5 m^3/min (c) 1687.5 m^3/min (d) 2022 m^3/min

80. **Which of the following empirical relation exists between depth of hole (h) and the gas content (v), A and B are constants?**
(a) $v = Ax\,Bx\,h$ (b) $v = \frac{AB}{h}$ (c) $v = \frac{Ah}{1+Bh}$ (d) $v = \frac{Bh}{1+Ah}$

81. **What is the relation between size of coal and total methane gas content emitted at face?**
(a) directly proportional (b) inversely proportional
(c) in GP series (d) in AP series

82. **Sample of air collected in the intake and return gates of an advancing longwall face show 0.3 and 0.9% methane respectively. Calculate the methane emission per tonne of coal mined if production from the free averages 800t per day and air quantity of 24 m^3 per sec circulates along the face?**
(a) 5.5 m^3 (b) 10.5 m^3 (c) 15.5 m^3 (d) 20.5 m^3

83. **Which of the following empirical relation is used to find out the methane layering number in terms of air velocity (v), width of airway (w), quantity of methane (q) emitted in air?**

(a) $\frac{v}{(4.32q/w)^{2/3}}$ (b) $\frac{v}{(4.32v/w)^{2/3}}$

(c) $\frac{w}{(4.32q/v)^{2/3}}$ (d) $\frac{(4.32q/w)^{2/3}}{v}$

84. **Which of the following means is adopted to break the methane layering?**
(a) increased air velocity (b) methane probe
(c) venture blower (d) water spraying

85. **As per Indian law the methane concentration should not exceed "A%" in any part of the mine. A is given by**
(a) 0.5% (b) 0.75% (c) 1% (d) 1.25%

86. **As per Indian law the methane concentration should not exceed "A%" in the return of a ventilation district. A is given by**
(a) 0.25% (b) 0.45% (c) 0.75% (d) 1.25%

87. **What is the rate of stone dust loading per meter of shelf length for heavy type barriers?**
(a) @ 30 Kg/m length of shelf (b) @ 65 Kg/m length of shelf
(c) @ 100 Kg/m length of shelf (d) @ 150 Kg/m length of shelf

88. **What is the rate of stone dust loading per meter of shelf length for light type barriers?**
(a) 10 kg (b) 20 kg (c) 30 kg (d) 40 kg

89. **How much of stone dust is required per square meter cross-sectional area of gallery for light type of barriers?**
(a) 30 kg (b) 70 kg (c) 110 kg (d) 150 kg

90. **How much of stone dust is required per square meter cross-sectional area of gallery for heavy type of barriers?**
(a) 250 kg (b) 320 kg (c) 390 kg (d) 460 kg

91. **What is the suitable distance of location of heavy type of barriers from farthest face?**
(a) 265 m (b) 365 m (c) 465 m (d) 600 m

92. **Non-collagenous pneumoconiosis is caused by**
(a) fibrogenic dust (b) non fibrogenic dust
(c) silica dust (d) barium sulphate

93. **In order to suppress dust to be air-borne, apart from water what else is sprayed or mixed with it?**
(a) aluminum dust (b) boric powder
(c) common salt (d) soda powder

94. **Dust suppression by water has one of the following disadvantages?**
(a) causes the belt to slip (b) worker take test during this period
(c) blasting efficiency becomes poor (d) increases humidity in the mine

95. **Which type of machinrye is used to clean the dust-laden air?**
(a) jig machine (b) vortex cleaner
(c) cyclone separator (d) electrostatic diffusion

96. **A fan ventilating a heading through a duct of 750mm diameter circulates 5m^3 s^{-1} of air at the face. Calculate the heat added to the air by the fan, if the input power of the fan is equal to 3kW.**
(a) 1667 J (b) 2617 J (c) 2917 J (d) 3317 J

97. **What do you mean by specific heat of air?**
(a) Amount of heat required to raise the temperature of a unit mass of air by one Kelvin
(b) Amount of air required to lower the temperature of a unit mass of air by one Kelvin
(c) Amount of heat required to raise the temperature of a unit volume of air
(d) Amount of heat required to raise the temperature of a mixture of gases

98. **In a mine airway of 2.25 x 1.6 m size, the velocity of air is 0.8 m/sec. Calculate the maximum velocity at which the flow still remains truly laminar. Kinematic viscosity is 0.16 x 10^{-4} m^2 s^{-1}**
(a) 0.015 m s^{-1} (b) 0.016 m s^{-1} (c) 0.017 m s^{-1} (d) 0.02 m s^{-1}

99. **The nature of flow of a fluid is governed by a dimensionless parameter called**
(a) Boundary later (b) Reynold's number
(c) resistance co-efficients (d) turbulent fluid

100. **Which of the following drilling method causes less bit wear**
(a) wet drilling (b) dry drilling
(c) Holman wet drilling (d) konningsborn drilling with water flushing

101. A wet drilling at a drift produces dust concentration of 450 ppcc in the respirable size range while dust concentration rises to 750 ppcc if drilling is done dry. Calculate the amount of respirable size produced per minute in either case if the drift face is ventilated by a tube delivering 3 m^3 per sec of fresh air. Calculate the efficiency of dust suppression by wet drilling.

(a) 6.1 x 10^{10} (wet), 11.5 x 10^{10} (dry), 30%
(b) 7.1 x 10^{10} (wet), 12.5 x 10^{10} (dry), 30%
(c) 8.1 x 10^{10} (wet), 13.5 x 10^{10} (dry), 30%
(d) 9.1 x 10^{10} (wet), 14.5 x 10^{10} (dry), 30%

102. For gravitational setting of dust laden air in a setting chamber where dust setting down by gravity, which of the following relation for retention time (t) in chamber satisfy the equation

(a) t = Q/lhb (b) t = lb/Qh (c) t = 1hb/Q (d) t = hl/Qb

where

l = length of chamber, h = height of setting chamber, b = breadth of chamber, Q = quantity of air flowing

103. Which type of Stone Dust Barrier is placed out bye of the face?

(a) heavy barriers (b) light barriers
(c) intermediate barriers (d) any kind of barriers

104. Provision of Stone Dust Barrier has been given in which of the following circulars?

(a) 3/1975 (b) 4/1975 (c) 5/1975 (d) 6/1975

105. Optimum rate of stone dusting in underground coal mines is

(a) 1 Kg/ton of coal produced (b) 2.5 Kg/ton of coal produced
(c) 5 Kg/ton of coal produced (d) 10 Kg/ton of coal produced

106. Which of the following refrigerant is used as coolant in Kolar Gold Fields Champion Reef mine?

(a) CH_4 (b) $CaCl_2$ (c) CCl_2F_2 (d) NH_3

107. It is often expressed in refrigeration tone (Rt) which is equal to a rate of heat removal of "A" Kw. A is given by

(a) 2.5 Kw (b) 3.5 Kw (c) 5.5 Kw (d) 10.5 Kw

108. It has a large latent heat of evaporation, evaporates and condenses nearly at atmospheric temperature and pressure. Identify it

(a) refrigerant (b) centrifugal compressor
(c) brine water (d) sodium chloride solutions

109. What should be the minimum insulation resistance of medium power cable?

(a) 0.5 mega Ohm (b) 1 mega Ohm (c) 1.5 mega Ohm (d) 10 mega Ohm

110. What should be the minimum insulation resistance of high power cable?

(a) 10 mega Ohm (b) 15 mega Ohm (c) 25 mega Ohm (d) 50 mega Ohm

111. Four airways are arranged as a series circuit. Their resistances, in units of 10^{-10} in are : (i) 2.627 N-sec^2/m^8, (ii) 0.151 N-sec^2/m^8, (iii) 0.349 N-sec^2/m^8, (iv) 0.397 N-sec^2/m^8. If the quantity is 47.2m/sec, find the pressure difference across the circuit.

112. Mean air temperature of a 450 m deep downcast shaft is 29 °C and that of the upcast shaft is 37 °C. The height of the motive column in m is

(a) 8.2 (b) 9.5 (c) 11.6 (d) 12.8

113. The total pressure and the static pressure measured at a point in a ventilation duct are 20 mm and 10 mm of water gauge respectively. If density of air is 1.2 kg/m^3, the velocity of the air in m/s is

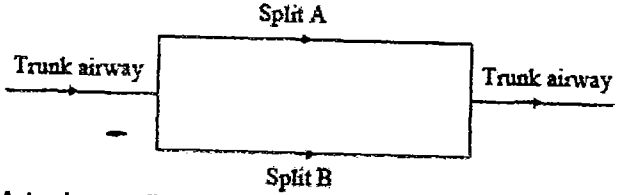
(a) 14.08 (b) 12.78 (c) 8.53 (d) 6.24A-1

114. Air samples collected from the intake and the return gates of a retreating longwall face show CH_4 concentration values of 0.1 % and 0.8 % respectively. The production from the longwall face is 2000 tonne/day and the air quantity circulating the face is 15 m^3/s. The rate of methane emission in m^3 per tonne of coal produced is

(a) 11.0 (b) 9.5 (c) 5.5 (d) 4.5

A-1 : Common Data for Questions 115 and 116:

A mine ventilation system consists of two splits A & B with resistances of 0.8 Ns^2m^{-8} and 3.2 Ns^2m^{-8}, respectively as shown in figure. Trunk airways have resistance of 0.2 Ns^2m^{-8}. The main mine fan is generating pressure of 500 Pa.



115. A toxic gas flows into a mineworking place at the rate of 2.52 m3/min. The concentration of the gas in the intake air is 0.25%. The minimum quantity of intake air in m3/min required to dilute the gas to its threshold limit value of 1.0 % is

(a) 123 (b) 252 (c) 295 (d) 333

116. Calculate the theoretical difference in the quantity of air delivered by an auxiliary fan if its ducting of 46cm dia. is replaced by a 36cm dia.

117. Pressure characteristic of a mine fan is given by, P = -0.06 Q2 + 400, where p is the pressure in Pa and Q the quantity in m3/s. The resistance of the mine is 0.19 Ns2/m8.
The mine quantity in m^3/s is
(a) 160.0 (b) 53.5 (c) 45.9 (d) 40.0

118. Pressure characteristic of a mine fan is given by, P = -0.06 Q2 + 400, where p is the pressure in Pa and Q the quantity in m3/s. The resistance of the mine is 0.19 Ns2/m8.
An identical fan is installed in the mine to operate in series with the existing fan. The new mine quantity in m3/s is
(a) 75.6 (b) 56.7 (c) 50.8 (d) 30.2

119. An exhaust fan attached to an evasee of 18 m2 cross-sectional area at the outlet circulates 150 m3/s of air at the pressure of 1000 Pa in a mine ventilation system. The ratio of the inlet to outlet area of the evasee is 1:4 and the density of air is 1.2 kg/m3. The quantity of air circulated in the mine in absence of evasee is 120 m3/s. The evasee efficiency in % is
(a) 57.6 (b) 43.2 (c) 39.06 (d) 37.7

120. A fan circulates 24 m3/s of air at a pressure of 1200 Pa in a ventilation district. It is intended to reduce the air quantity to 16 m3/s by placing a regulator. Assuming the pressure remains unchanged, the size of the regulator in m2 is
(a) 1.48 (b) 0.74 (c) 0.37 (d) 0.18

121. The air quantities in m^3/s circulated in the splits A and B respectively are
(a) 20 and 30 (b) 30 and 20 (c) 20 and 10 (d) 40 and 10

122. The flows in the two splits are equalized by placing a booster fan in split B. Assume that the fan pressure does not change after installation of the booster fan. The size of the booster fan in Pa is
(a)749.05 (b) 850.08 (c) 950.02 (d)1000.5

123. An air sample taken from the return airway of a district contains the following gases. The Graham's ratio for the district is

Gas	Concentration (in %)
CO2	0.40
H4	1.17
O2	19.92
N2	78.49
CO	0.02

(a) 5.6 (b) 4.8 (c) 3.0 (d) 2.3

124. An incandescent headlight of a mining vehicle is of spot beam type with a beam angle of 30^0. The spherical surface in m^2 subtended by the lighted beam at a distance of 5 m from the headlight is
(a) 7.5 (b) 15 (c) 21 (d) 25

125. If velocity of air in a settling chamber in 0.3 m/s, terminal velocity of the particle is 0.19 m/s then find out h/l ratio of the chamber assuming eddy factor 0.5
(a) 0.316 (b) 0.416 (c) 0.516 (d) 0.616

126. A mine airway having cross-section of 2.2m x 2.2m and length 500m contains a bend. If the airway friction factor is 0.01 Ns^2m^{-4}, shock loss factor for the bend is 0.07 and density of air is 1.2 kg/m^3, the equivalent length of the airway in m is _____

127. In order to estimate the NVP in a mine, measurements are made at the mine fan as shown below.

Fan speed (RPM)	Fan drift pressure (Pa)	Fan quantity (m^3/s)
800	655	82.2
950	730	85.0

The NVP NVP in Pa is _____

128. The resistance of two splits A and B are 0.35 Ns^2m^{-8} and 0.05 Ns^2m^{-8} respectively. The combined resistance of the shaft and trunk airways in 0.4 Ns^2m^{-8}. A booster fan is planned to be installed in split A to increase the quantity flowing through it. Assuming that the surface fan continues to operate at a constant pressure of 1000 Pa, the critical pressure of the booster fan in Pa is _____

129. Calculate the w.g produced by a 3.2 m diameter fan running at 280 rpm and delivering 7500 m3/min of air, if the blades are redial, assume air density = 1.2 Kg/m3
(a) 240 (b) 270 (c) 300 (d) 330

130. The evasee chimney of a fan has an area of 4 m^2 at the base and 14 m^2 at the outlet. Calculate the saving on w.g due to evasee when the output of a fan is 6000 m^2/min
(a) 25 mm of w.g (b) 35 mm of w.g (c) 45 mm of w.g (d) 55 mm of w.g

131. In an underground mine, one district is ventilated by 40 m^3/sec. Water gauge across the district is 30mm. Calculate the size of the regulator, if the quantity has to be reduced to 25 m^3 /s by installing a regulator in the return of the district,
(a) 2.22 m^2 (b) 3.33 m^2 (c) 4.44 m^2 (d) 5.1 m^2

132. At the junction of the heading to be ventilated, why auxiliary fan of forcing type is installed in the airway at least 9m up stream of the corner of pillar?
(a) To allow minimum deposition of dust
(b) To avoid recirculation of hot return air mixed with dust & gases
(c) To avoid chances of any explosion
(d) To avoid mixing of intake and return air

133. What happens if more than one auxiliary fan is used in one ventilating district?
(a) It Recirculates air having dust & noxious gases
(b) It Deposits of dust on the fan moving pasts
(c) The chances of electrostatic sparking
(d) It affects the air quality being circulated

134. By installing an Auxiliary fan - a forcing fan used below ground for ventilating-
(a) Whole current of air passing along intake of return airways of a mine
(b) A ventilating district
(c) One or more faces forming a part of ventilating district
(d) None of the above

135. The main purpose of a Booster fan - a mechanical ventilator used below ground for -
(a) Ventilating one or more faces in the part of a district
(b) Boosting whole current of air passing along intake or return airway of a mine or ventilating district
(c) Both of the above (d) None of the above

136. What do you mean by Mechanical efficiency of a fan?
(a) the ratio of the power actually absorbed by the impeller and converted into head to the power applied to the shaft
(b) the ratio of the power in the air to the input power
(c) the ratio of input head to Euler's head
(d) the ratio of total head developed to the velocity head

137. This fan characteristics helps in selecting a particular mine?
(a) efficiency-capacity fan characteristics (b) power-capacity fan characteristics
(c) head-capacity fan characteristics
(d) mechanical losses-hydraulic losses characteristics

138. Eddy losses for fan is significant when
(a) fan runs at its full capacity (b) fan operates at low volumes
(c) the fan drift cross-section is very high
(d) the fan drift cross-section is very less

139. Name the losses at the impeller inlet and outlet, in addition to the skin friction and diffusion losses.
(a) eddy and separation losses (b) losses due to leakages
(c) mechanical losses (d) hydraulic losses minus friction loss in the channel

140. Head co-efficient is defined as?
(a) it is the ratio of the head at the operating point to Euler's head at zero capacity
(b) it is the ratio of the square of the impeller speed to power input
(c) it is the ration of the head developed to the square of the speed
(d) it is the ratio of the speed to the Euler's head at maximum efficiency

141. Define the specific capacity of a fan?
(a) it is the dimensionless characteristic describing the performance of an impeller
(b) this is an important design factor used as type number for grouping impellers hydraulically
(c) it is the dimensionless design constant used to form a continuous function of specific speed of fan
(d) it is ratio used to determine the design of the volute casting

142. For fans of 760 mm size (back ward bladed), what should be the maximum allowable gap between the impeller and the impeller inlet -
(a) 1mm (b) 3mm (c) 6mm (d) 10mm

143. How to minimize the leakage loss and improving the efficiency in the design of impeller of fan of low specific speed?
(a) As little gap to be maintained between the side of the stationary casing and the rotating impeller as possible
(b) providing maximum clearance between the inlet and the wheel
(c) the clearance between the tip of the cut-off sheet and the fan wheel should not be more than 3% of the wheel diameter
(d) the tip of the cut-off sheet is usually rounded or blunted

144. Define angle of attack?
(a) it is the angle between the drag component and lift component of the force acting on an aerofoil
(b) the angle between the chord of the aerofoil and the direction of the average relative velocity of air
(c) the angle between the undisturbed actual air velocity and width of aerofoil
(d) it is the maximum distance between mean line to chord of aerofoil

145. **The curvature of diffuser vane shall be so fixed that the fluid enters the guide passage with minimum loss. This is possible only when –**
(a) the guide vane inlet angle is always less than D/2 rad
(b) the diffuser vane entrances angles are laid at same radii for a constant pitch
(c) the outlet velocity angle has tangential component only
(d) angle between guide vane inlet and the direction of the absolute velocity of air leaving the impeller is small or equal to zero

146. **In a continuous miner face, why forcing ventilation is undesirable?**
(a) it is very costly
(b) it occupies whole cross-section of the heading
(c) it exposes workers to high concentrations of dust
(d) it is unable to cope up with the rate of advance of continuous miner

147. **This factor do not have control over the circulation by natural ventilation?**
(a) barometric pressure (b) emission of methane
(c) circulation of refrigerated air (d) specific heat of air

148. **Surface temperature influence on natural ventilation will be less or negligible, in which situation?**
(a) in shallow mines (b) in deeper mines
(c) when fan size is inadequate (d) when the mine size is extensive

149. **Reversal of air-current of natural ventilation, occurs –**
(a) in shallow mines during summer to winter (b) in deeper mines during summer
(c) in shallow mines during spring (d) in deeper mines during autumn

150. **Using the following data, calculate the natural ventilating pressure in a mine**

Depth of the mine	=	400 m
Pit-bottom barometer reading	=	101 kPa
Pit-top barometer reading	=	99.5 kPa
Average temperature in DC shaft	=	305 K
Average temperature in UC shaft	=	23.7 Pa

(a) 13.7 Pa (b) 23.7 Pa (c) 43.7 Pa (d) 55 Pa

151. **Calculate the NVP (Pa) and find the equivalent orifice (m^2) of the mine? Using the following readings of the fan drift pressure and quantities with the fan running at two different speeds.**

Fan drift pressure at a speed of 29 rad s^{-1}	=	600 Pa
Fan drift quantity at a speed of 29 rad s^{-1}	=	80 m^3 s^{-1}
Fan drift pressure at a speed of 32 rad s^{-1}	=	680 Pa
Fan drift quantity at a speed of 32 rad s^{-1}	=	84 m^3 s^{-1}

(a) 170.5, 3.29 (b) 180.5, 3.69 (c) 190.5, 3.87 (d) 200.5, 3.97

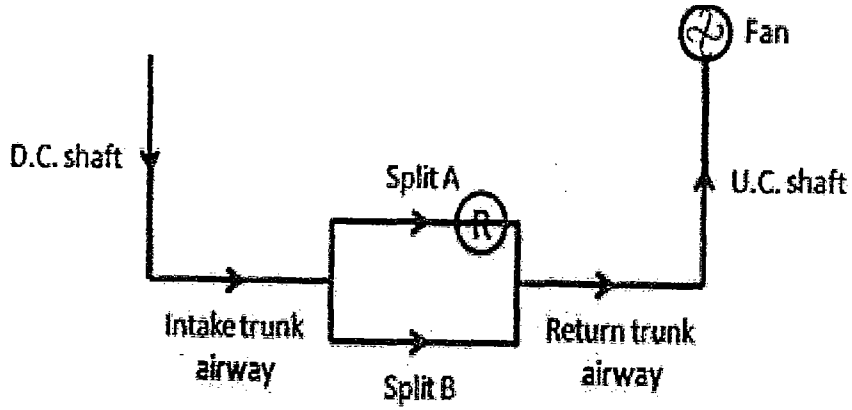
152. **What is the characteristic of velocities considered in Euler's equation?**
(a) it is the average velocity over the cross-section perpendicular to the direction of flow
(b) it is the true velocities over the air shaft
(c) it is the head developed by the centrifugal fan
(d) it is due to the torque generated by the fan itself

153. **What do you mean by vane efficiency?**
(a) the ratio of actual head to the theoretical head
(b) the ratio of the input head to Euler's head
(c) the ratio of input head to input head
(d) the ratio of total head developed to the velocity head

154. **A gas mixture contains CH4, C2H6 and H2 with respective concentrations of 75%, 15% and 10% by volume. The lower explosibility limit of CH4, C2H6 anf H2 are 5.0%, 3.3% and 4.2% respectively. The lower explosibility limit of the gas mixture, in pergentage is_____.**

155. **Intake air containing 0.2% methane enters a section of an underground mine where emission rate of methane is 0.05m^3s. Assuming that the threshold limit value of methane is 1.25%, the minimum quantity of fresh air required in m^3/s is_____.**

156. **For the ventilation system shown, the combined resistance of the trunk airways and the shafts is 2.2 Ns^2m^{-8}. The resistances of splits A and B are 0.5 Ns^2m^{-8} respectively. A regulator of size 2.0 m^2 is placed in split A. Considering the fan generates a pressure of 1000 Pa the air flow in m^3/s in split B is_____.**



157. A mine fan running at 300 rpm delivers 150 m^3/s of air at a pressure of 900 Pa. Fan and motor efficiencies are 75% and 90% respectively.
If the fan speed is reduced to 250 rpm, the saving in electric power input to the motor in kW is_____.

158. A mine air sample contains CH_4,CO,H_2,N_2 and O_2. The mine air analysis using Haldane apparatus gives the following results expresses in percentage of total sample volume.

Total contraction after combustion	: 10,0
CO_2 formed after combustion	: 6.0
O_2 consumed in combustion	: 9.5

The percentage of CH_4 in the sample analysed is _____.

159. In a fully mechanized bord and pillar mining system, winning of coal and its transportation from the face is commonly carried out with the combination of-
(a) continuous miner, shuttle car, feeder breaker and belt conveyor
(b) continuous miner, LHD, feeder breaker and chain conveyor
(c) continuous miner, SDL, feeder breaker and belt conveyor
(d) continuous miner, shuttle caar, feeder breaker and chain conveyor

160. In BOD test, 5ml of wastewater is diluted with pure water to fill a 300 ml BOD bottle. The initial and final dissolved oxygen contents of the mix are 9.0 mg/l and 7.0 mg/l respectively. The BOD of the wastewater, in mg/l, is-
(a) 2 (b) 10 (c) 120 (d) 600

161. Foam type extinguisher is not permitted to dealing with class 'C' fires because
(a) foam is inflammable (b) foam produces toxic chemicals
(c) foam is conductor of electricity (d) all of above

162. Which of the following is not the criteria that should be considered to decide the places where air velocity in underground mines to be measured?
(a) Roadways should have uniform cross section & preferably straight
(b) The cross section of roadways should be such that the area can be easily calculated
(c) Resistance of the roadway must be fairy high
(d) Roadway should be away from bends, junction & free from obstructions

163. The type of fire extinguisher that must NOT be used in case of fire in an electric substation located in an underground metal mine is
(a) multi-purpose dry chemical extinguisher (b) CO_2 snow extinguisher
(c) dry chemical powder extinguisher (d) foam extinguisher

164. Given k is the thermal conductivity, p is density and c is specific heat of a rock sample, the thermal diffusivity of the rock sample is
(a) $\frac{kp}{c}$ (b) $\frac{pc}{k}$ (c) $\frac{kc}{p}$ (d) $\frac{k}{pc}$

165. Cyclone, bag filter and scrubber can be used for control of
(a) water pollution (b) air pollution
(c) soil pollution (d) noise pollution

166. This instrument is used for counting and size analysis of a suspended cloud of aerosols
(a) gravimetric dust sampler (b) tyndalloscope
(c) holographic counter (d) royco particle counter

167. Ascensionally ventilated coal mine inclines ideally should have higher methane layering number when compared to descensionally ventilated inclines. The reason is-
(a) In ascenssionally ventilated incline density of air is higher.
(b) Ascenssionally ventilated incline creates conditions for improved turbulent mixing of methane layer.
(c) Methane drainage is not practiced in ascensionally ventilated incline.
(d) Descensionally ventilated incline creates condition for improved turbulent mixing of methane layer.

168. Acoolant is a desirable component in the design of a Self-Contained Breathing Apparatus since-
(a) surroundings can be hot and humid during rescue.
(b) a rescue worker generates large amount of metabolic heat.
(c) exhaled air CO2 absorption is an exothermic reaction.
(d) exhaled air water vapour has to be condensed.

169. Determine the correctness or otherwise of the following Assertion (a) and the Reason (r)
Assertion: Both intake and return side stopping must be closed simultaneously in the event of sealing off a coal mine panel with explosion hazard following a fire.
Reason: By continuously ventilating the area till simultaneous closure of the stoppings, the possibility of an explosion hazard due to gas build-up is avoided.
(a) (a) is true but (r) is false
(b) Both (a) and (r) are true and (r) is the correct reason for (a)
(c) Both (a) and (r) are true and (r) is not the correct reason for (a)
(d) Both (a) and (r) are false

170. At a surface mine office the independent Sound Pressure Levels (SPL) measured in dB(A) on account of 3 drill machines are 85,88 and 85. If all the three machines works simultaneously, the combined SPL, in dB(A), is-
(a) 91 (b) 90 (c) 92 (d) 94

171. An air quality parameter required to be monitored under the Indian National Ambient Air Quality Standards is-
(a) As (b) Pb (c) Hg (d) Silica

172. The temperature of a parcel of air decreases from 30.2°C to 28.9°C as it rises from an altitude of 20m to 120m. The lapse rate for the atmosphere is-
(a) Subadiabatic (b) adiabatic (c) super-adiabatic (d) transadiabatic

Answer Key

1.	(c)	29.	(d)	57.	(d)	85.	(d)
2.	(b)	30.	(a)	58.	(c)	86.	(c)
3.	(c)	31.	(d)	59.	(c)	87.	(c)
4.	(d)	32.	(b)	60.	(d)	88.	(c)
5.	(d)	33.	(c)	61.	(c)	89.	(c)
6.	(c)	34.	(d)	62.	(a)	90.	(c)
7.	(d)	35.	(c)	63.	(a)	91.	(b)
8.	(c)	36.	(c)	64.	(c)	92.	(b)
9.	(d)	37.	(b)	65.	(c)	93.	(c)
9.	(b)	38.	(d)	66.	(b)	94.	(d)
11.	(d)	39.	(a)	67.	(b)	95.	(c)
12.	(b)	40.	(b)	68.	(b)	96.	(b)
13.	(b)	41.	(c)	69.	(a)	97.	(a)
14.	(b)	42.	(d)	70.	(a)	98.	(c)
15.	(a)	43.	(a)	71.	(b)	99.	(b)
16.	(d)	44.	(b)	72.	(b)	100.	(b)
17.	(d)	45.	(d)	73.	(a)	101.	(c)
18.	(d)	46.	(b)	74.	(a)	102.	(c)
19.	(c)	47.	(d)	75.	(b)	103.	(a)
20.	(b)	48.	(b)	76.	(a)	104.	(d)
21.	(b)	49.	(c)	77.	(c)	105.	(b)
22.	(b)	50.	(c)	78.	(b)	106.	(c)
23.	(b)	51.	(b)	79.	(c)	107.	(b)
24.	(a)	52.	(c)	80.	(b)	108.	(a)
25.	(d)	53.	(d)	81.	(b)	109.	(b)
26.	(b)	54.	(c)	82.	(c)	110.	(a)
27.	(b)	55.	(a)	83.	(a)	111.	H= $(R_1+R_2+R_3+R_4)Q^2$ = (2.627+0.151 + 0.349+0.349)(10^{10})(47.2)^2 = 7.84 kPa
28.	(b)	56.	(b)	84.	(c)	112.	(c)
						113.	(b)
						114.	(d)
						115.	(d)
						116.	*Let quantity of air delivered with 46cm dia. duct = Q Quantity with 36cm dia duct = q Dia. of existing duct = D Dia. of the new duct = d* $q = Q \times (d/D)^3 = Q \times 0.47$
						117.	(d)
						118.	(c)
						119.	(a)
						120.	(b)
						121.	(c)
						122.	(a)
						123.	(d)
						124.	(c)
						125.	(a)
						126.	502 to 503
						127.	258 to 253
						128.	874 to 876
						129.	(b)
						130.	(b)
						131.	(a)
						132.	(b)
						133.	(a)
						134.	(c)
						135.	(b)
						136.	(a)
						137.	(c)
						138.	(b) (d)
						139.	(a)
						140.	(a)
						141.	(a)
						142.	(b)
						143.	(a)
						144.	(b)
						145.	(d)
						146.	(c)
						147.	(d)
						148.	(b)
						149.	(a)
						150.	(c)
						151.	(b)
						152.	(a)
						153.	(b)
						154.	4.2 to 5.0
						155.	4.6 to 4.9
						156.	10.2 to 10.8
						157.	82 to 86
						158.	3.8 to 4.2
						159.	(a)
						160.	(c)
						161.	(c)
						162.	(c)
						163.	(d)
						164.	(d)
						165.	(b)
						166.	
						167.	
						168.	
						169.	
						170.	
						171.	
						172.	

Chapter 10

Method of Work (Metal)

1. **Which of the following method may be approaching obsolescence and proved to be the most expensive of all mining method ?**
   (a) Square set stoping (b) Shrinkage stoping
   (c) Cut and fill stoping (d) Blasting gallery

2. **Which of the following method of mining is only applicable to metal mining ?**
   (a) Bord and pillar mining (b) Stope and pillar mining
   (c) Sublevel stoping (d) Longwall mining

3. **A vertical method similar to stope and pillar mining in the supported class is known as –**
   (a) Stull Stoping (b) Square set stoping
   (c) Breast stoping (d) Shrinkage stoping

4. **Vertical or steeply inclined openings is suitable for**
   (a) Shrinkage stoping (b) Cut and fill stoping
   (c) Square set stoping (d) All of above

5. **Which of the following method employ horizontal opening?**
   (a) Room and pillar mining (b) Shrinkage stoping
   (c) Sublevel stoping (d) Cut and fill stoping

6. **Which of the following is not considered under unsupported class of underground mineral exploitation method ?**
   (a) Stope and pillar mining (b) Shrinkage stoping
   (c) Square set stoping (d) Sublevel stoping

7. **The process of underwater mining of sand, clay, tin and placer deposits of gold is known as**
   (a) Hydraulicking (b) Dredging
   (c) Placer mining (d) Leaching

8. **Out of the two basic system of leaching, if one is chemical, what is the other?**
   (a) Physical (b) Mechanical
   (c) Bacterial (d) Physico-electrical

9. **Cut and fill stoping can be done by**
   (a) Underhand method (b) Overhand method
   (c) Caving method (d) All the above

10. **It is the mining method in which masses, panels or block of ore are undercut to induce caving, permitting the broken ore to be drawn off below**
    (a) Sublevel caving (b) Integral caving
    (c) Block caving (d) Blasting gallery

11. **Ore grade for which revenue from the recoverable reserve exactly equals to the cost of mining , treatment, and marketing is known as :**
    (a) cut-off grade (b) average grade
    (c) break-even grade (d) liquidation grade

12. **Zinc deposit is formed by geological process called –**
    (a) Hydrothermal (b) Magmatic separation
    (c) Supergene (d) None of the above

13. **Gestation period is –**
    (a) the time interval between the commencement of mining and production
    (b) the time interval between the commencement of mining & mining close
    (c) lag on ignition period
    (d) time to reach the break even point.

14. **In Ring Drilling by drifters we normally use the drill bits having dia. in mm –**
    (a) 25 & 32 (b) 33 & 44 (c) 45 & 64 (d) 65 & 100

15. **Cut and Fill stoping follows –**
    (a) Underhand method (b) Overhand method
    (c) Both (a) & (b) (d) None of the above

16. **In VCR method of mining, blasting is undertaken –**
    (a) One Row after another is blasted (b) With mass blast initial slot is created
    (c) All holes in the slice is blasted (d) One column after the other is blasted

17. **When the core samples from Ore & Wall is tested low, we adopt –**
    (a) Shrinkage stoping (b) Block Caving
    (c) Sub level Stoping (d) Cut & Fill stoping

18. **In the form of a square pyramid blasted material of 7368 m^3 by volume is accommodated. The height of the pyramid is 24 m. Calculate the surface area in m^2 :**
(a) 1842 (b) 614 (c) 1228 (d) 2456

19. **Ladderways are used for men and what is the extended length of the ladder above the mouth –**
(a) 1.0 m (b) 1.5 m (c) 2.0 m (d) 0.5 m

20. **This stoping method is of high cost -**
(a) cut & fill method (b) square set (c) sub-level (d) block caving

21. **Vertical Crater Retreat Method is a modified version of**
(a) sub-level (b) cut & fill (c) block caving (d) stope & pillar

22. **The draw point spacing in caving method is dependent on**
(a) mechanization used (b) length of the stope
(c) area of influence of the draw point (d) size of the ore broken

23. **In case of metalliferous mine, if depth of a shaft exceeds 1000 m but not 1500 m, no winding rope shall be used or continued in use, if its F.O.S. is or becomes less than**
(a) 9 (b) 9 (c) 7 (d) 6

24. **In Cut & Fill stoping it is done by**
(a) underhand method (b) overhand method
(c) caving method (d) all of the above

25. **Crown Pillar is**
(a) at the top of the stope (b) just above the ore drawing crosscuts
(c) on the side of the stope (d) at the base

26. **Which of the following method of metal mining is only applicable to coal mines?**
(a) bord and pillar mining (b) stope and pillar mining
(c) sublevel stoping (d) long wall mining

27. **A vertical method similar to stope and pillar mining in the supported class is known as**
(a) stall stoping (b) square set stoping
(c) breast stoping (d) shrinkage stoping

28. **Wide stall method is practiced by**
(a) Widening the gallery (b) By stoking the pillar
(c) By partial extraction (d) None of the above

29. **Main purpose of wide stall method is**
(a) To increase the percentage of extraction (b) For avoiding subsidence
(c) To increase the extraction rate (d) None of the above

30. **Which of the following method may be approaching obsolescence and proved to be the most expensive of all mining methods?**
(a) square set stoping (b) shrinkage stoping
(c) cut and fill stoping (d) blasting gallery

31. **Top slicing is an underhand caving method which is a variation of**
(a) breast stoping (b) shrinkage stoping
(c) sublevel stoping (d) cut and fill stoping

32. **It is the mining method in which masses, panels or block of ore are undercu to induce caving, permitting the broken ore to be drawn off below**
(a) sublevel stoping (b) block caving
(c) integral caving (d) sublevel stoping

33. **Soutirage mining is also**
(a) sublevel stoping (b) integral caving
(c) block cacing (d) blasting gallery

34. **Sublevel caving with semi-mechanized wire-netting system was first practiced in which of the following colliery in India with the help of French mining engineers?**
(a) Bhurkunda colliery (b) Girmint colliery
(c) Chirimiri colliery (d) Gidi-A colliery

35. **Extraction to a small sized, irregular and unsystematic underground working is called**
(a) sublevel stoping (b) gophering
(c) room and pillar mining (d) sublevel stoping

36. **A deposit has a width of 50m, a length of 2000m, and a depth of 1000m. The average ore density is 3.5 t/m3 . The mining company has to build a new haulage level and asks if the interval shall be 100,150, or 200m. The production is estimated at 4 million t/a of ore. The required fixed investment is estimated at Rs. 2500 million and the variable at Rs.1250 million per 100 m. The interest rate is 15%. The problem is to find the best depth for the new level. In this**

example, only the capital costs are studied.

Answer: Amount of ore: 100m: 50 × 2000 × 100 × 3.5 = 35.0 [illegible]
150 m: 50 × 2000 × 150 × 3.5 = 52.50 [illegible]
200 m: 50 × 2000 × 200 × 3.5 = 70.0 [illegible]
Ore loss : 20%
Life time of the level:
100m: 35 [illegible] (0.8/4) [illegible] 7.0 [illegible]
150 m: 52.5 [illegible] (0.8/4) [illegible] 10.50 [illegible]
200 m: 70 [illegible] × (0.8/4) [illegible] 14.0 [illegible]

Required Total Investment:
100 m: 2500 [illegible] 1.0 × 1250 = 3,750.00 [illegible]
150 m: 2500 [illegible] 1.5 × 1250 = 4,375.00 million
200 m: 2500 [illegible] 2.0 × 1250 = 5000.00 million

Average capital costs per year:
100 m: 3,750.00 [illegible] 0.240 = 9,002.40 [illegible]
150 m: 4,375 [illegible] 0.195 = 853.125 [illegible]
200 m: 5000.00 [illegible] 0.175 = 875.00 [illegible]

On the basis of the optimal depth for the new level would seem to be about 150m below the existing level.

37. In a room-and-pillar stope, bench blasting is conducted using ANFO having density of 800kg/m3. The specific gravity of rock is 2.5, hole diameter is 100mm, and spacing to burden ratio is 1.3. The charge length of each blast hole is 80% of the hole length. For a desired powder factor of 0.48 kg/tonne, the spacing and burden of the blast pattern in m respectively are –

(a) 2.0, 2.6 (b) 2.3, 1.8 (c) 5.2, 4.0 (d) 1.3, 1.0

38. In underground, from the footwall shaft cross-cuts are drawn to intersect the orebody and raises are made to connect the cross-cuts. The top of the raises are widened. Name the method of extraction.

(a) open under hand stoping (b) open overhand stoping
(c) underground glory hole or milling (d) breast stoping

39. This method is used for mining narrow veins or pay streaks, where the ore occurs as a distinct band and can be separated easily from the wall rocks. The method of mining is known as

(a) room and pillar mining (b) widestall method
(c) resuing or stripping (d) integral caving

40. Which of the following method is not considered under unsupported class of underground mining method of extraction ?

(a) Stope and pillar mining (b) Shrinkage stoping
(c) Square set stoping (d) Sub level stoping

41. Cut and fill stoping can be done by

(a) Underhand method (b) Overhand method
(c) Caving method (d) All of the above

42. It is the mining method in which masses, panels or block of ore are undercut to induce caving, permitting the broken ore to be drawn off below –

(a) Sublevel caving (b) Inegral caving
(c) Block caving (d) Blasting gallery

43. Match correctly for ore body conditions given in column A to method of working in column B.

Column A	Column B
(i) Strong, moderately thick, flat dipping orebody	(a) Cut and fill
(ii) Strong , steeply dipping ore with strong host rock	(b) Sublevel
(iii) Very weak moderately dipping ore with very weak host rock	(c) Room & Pillar
(iv) Strong to weak fairly steep ore with weak host rock	(d) Square set

44. Match correctly for method of workings given in (A) column to nature of support in column (B)

Column A (Method of work)	Column B (Nature of support)
(i) Room and Pillar	(a) Artificially supported
(ii) Shrinkage stoping	(b) Heavily supported
(iii) Sublevel caving	(c) Naturally supported
(iv) Square set support	(d) Unsupported

45. Match correctly for method of stoping given in column A to blast hole drilling in column B

Column A (method of stoping)	Column B (Blast hole drilling)
(i) Breast stoping	(a) Large diameter downward parallel hole
(ii) Cut and Fill method	(b) Ring drilling and blasting
(iii) Conventional sublevel	(c) Blast hole drilled in horizontal direction
(iv) VCR stoping	(d) Blast hole drilled in upward but not in ring fashion

46. In order for mining of minerals to be sustainable, we will need to .....

(a) develop efficient mineral extraction techniques
(b) use minerals more efficiently
(c) find deeper deposits of rare minerals
(d) consider that minerals are a non-renewable resource, so mining them cannot be sustainable.

47. **What materials are mined using placer mining ?**
(a) Salt (b) Coal
(c) Precious metals & gems (d) Sand

48. **Which metal is currently mined from ocean floor ?**
(a) Sand (b) Sulfur (c) Silica (d) Manganese nodules

49. **For a shrinkage stope the following data values are given**

Insitu tonnage	9000 tonne
Insitu grade	5.2 g/tonne
Average grade of waste	1.4 g/tonne
Loss of ore in the stope	10%
Dilution	20%

The grade at the mill-head in g/tonne is _____
(a) 4.5 to 4.518 (b) 4.2 to 4.215 (c) 6.3 to 6.344 (d) 1.3 to 1.367

50. **A 4.6 m wide vein dipping at 800 is mined by horizontal cut-and-fill stoping method. The fill is to be placed in the stope along the length of 46 m and to a height of 3.0 m. If the specific weight of the fill material is 15.86 kN/m3 and the porosity is 35%, under fully saturated conditions the volume of water in the fill in m^3 is**
(a) 222.18 (b) 332.40 (c) 336.44 (d) 634.80

51. **A 4.6 m wide vein dipping at 800 is mined by horizontal cut-and-fill stoping method. The fill is to be placed in the stope along the length of 46 m and to a height of 3.0 m. If the specific weight of the fill material is 15.86 kN/m3 and the porosity is 35%, under fully saturated conditions the mass of solids in saturated fill in tonnes is**
(a) 820.00 (b) 804.10 (c) 799.30 (d)788.80

52. **The most dangerous form of mining (for the miners) is** _____
(a) Strip mining (b) placer mining
(c) Underground mining (d) Open-pit mining

53. **The excess pore pressure in backfill material is a cut-and-fill stope leads to**
(a) reduction in strength of the wall rock
(b) enhancement of bearing strength to fill
(c) loss of shear resistance of fill
(d) prevention of progressive failure of crown pillar

54. **The primary purpose of cut holes for blasting in an underground drivage is to**
(a) provide additional free face (b) have smooth surface after blasting
(c) prevent over-breakage (d) reduce noise

55. **Match the method of mining with strength of orebody, type of support a orebody geometry –**

Strength	Support	Geometry	Method
P. Strong	L. Unsupported	X.Tabular and steep	1. Cut-and-fill
Q.Moderate	M.Artificially supported	Y. Tabular and flat	2. Block Cavin
R. Weak	N. Self-supporting	Z.Massive and steep	3. Room and Pill

(a) P-M-X-3, Q-N-Z-2, R-L-Y-1
(b) P-L-X-1, Q-N-Z-3, R-M-Y-2
(c) P-N-Y-3, Q-M-X-1, R-L-Z-2
(d) P-L-Z-1, Q-N-Y-3, R-M-X-2

56. **: Rill stoping method is a form of**
(a) block caving (b)artificially supported stoping
(c) underhand stoping (d) overhand stoping

57. **For a shrinkage stope the following data values are given**

Insitu tonnage	9000 tonne
Insitu grade	5.2 g/tonne
Average grade of waste	1.4 g/tonne
Loss of ore in the stope	10%
Dilution	20%

The grade at the mill-head in g/tonne is.....

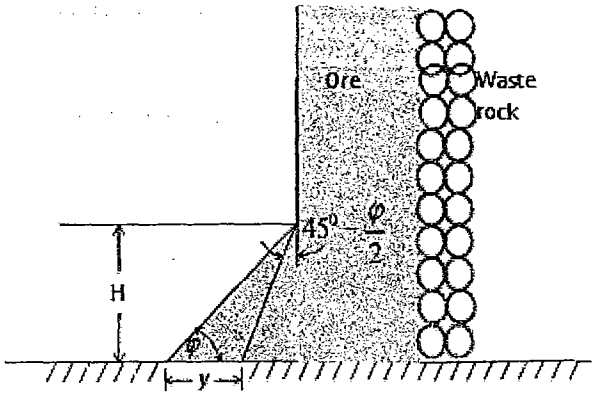
58. **In a cut-and-fill stope, the main purpose of the back filling is to**
(a) reduce ore dilution
(b) prevent high stress concentrations in far field domain
(c) prevent displacement due to dilation of fractured wall rock
(d) improve ore re-handling

59. **Match the following for ore handling operations in an underground meta mine**

Arrangement	Description
(P) Drawpoint	(I) arrangement that prevents oversized rock to pass
(Q) Ore pass	(II) a system of vertical or near vertical openings for transferreing ore from a stope to a single delivery point.
(R) Grizzly	(III) a place where ore can be loaded and removed
(S) Finger raise	(IV) a vertical or inclined opening used for transferring ore

(a) P-IV, Q-III, R-II, S-I (b) P-III, Q-IV, R-I, S-II
(c) P-II, Q-IV, R-I, S-III (d) P-III, Q-I, R-II, S-IV

60. **The height H of a drawpoint is a sublevel caving stope is 3.0m. If the angle of repose (Ø) of broken ore is 350, the digging depth y of the loader as shown in the figure in m is .....**

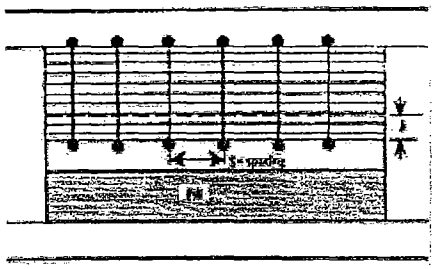


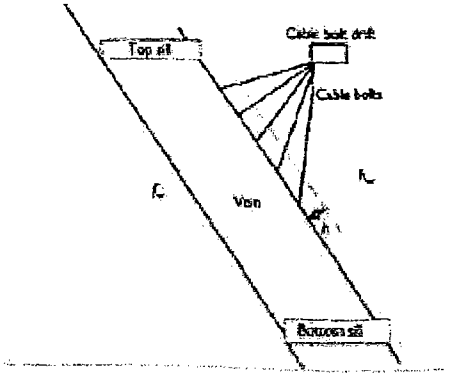
61. **Match the following**

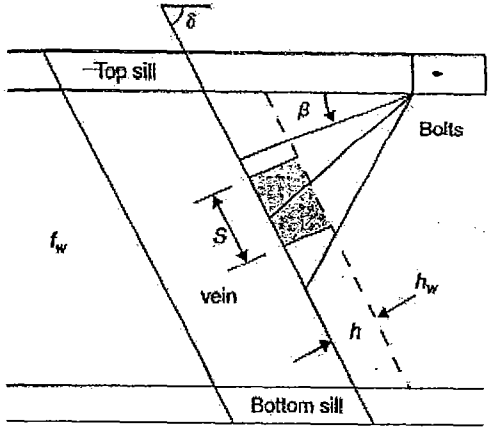
Method of mining	Stope support	Ore loading
P. Shrinkage stoping	1. Insitu pillar	a. Overhead mucker
Q. Blasthole stoping	2. Broken ore	b. Pneumatic autoloader
R. Top slicing	3. Timber mat	c. Load haul dumper

(a) P-2-a, Q-1-c, R-3-b
(b) P-2-a, Q-3-c, R-1-b
(c) P-2-b, Q-3-c, R-1-a
(d) P-3-c, Q-2-a, R-1-b

62. **Consider the cable bolting array shown in the figure. Develop an expression based on a requirement for equilibrium in the direction normal to the vein dip brings into association vein dip ä, bolting angle, from the horizontal, â, bolt spacing S, bolt tension T, and so forth. Note specific weight of rock is ã and two bolts per hole are used.**







Find: Equilibrium requirement, normal direction.

Solution:

$$\sum_n F = 0$$

$$0 = W_n - N_b$$

$$W_n = W\cos\delta,$$

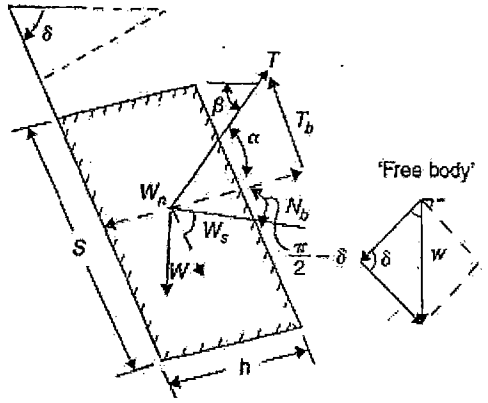
$$N_b = T\cos\alpha$$

$$\beta = \alpha + \frac{\pi}{2} - \delta$$

$$\alpha = \beta + \delta - \frac{\pi}{2}$$

$$\cos\alpha = \sin(\beta+\delta)$$

$$\therefore W\cos\delta = T_{\sin}(\beta+\delta)$$



where $W = \gamma S^2 h$ (square pattern)

Hence: $\gamma S^2 h\cos\delta = nf_b\sin(\beta+\delta)$ & $T = nf_b$

- γ = specific weight of rock
- S = spacing(square pattern)
- h = slab thickness
- δ = vein dip
- n = number of bolts per hole
- f_b = force per bolt
- β = bolting angle

63. **In an iron ore mine, sublevel caving is used. The iron content is 42% and the mine supplies a peletizing plant with an annual capacity of 3 million tons/ annum. The ore body is shown in the figure (a)below. The length of the ore body is 1000m and the width of 100m.**
Each slice is 10m high, and there are 10m between crosscuts, each of which has an area of 20m². The density of the ore is 3.5t/m³. The spacing between rings is 2m, and the extraction is 100%. The iron content is 66% in the pellets and 6% in the tailings. The problem is to develop a detailed production plan. A typical sublevel caving sequence is shown in figure (b).

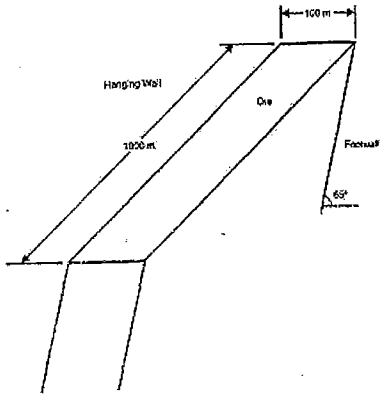
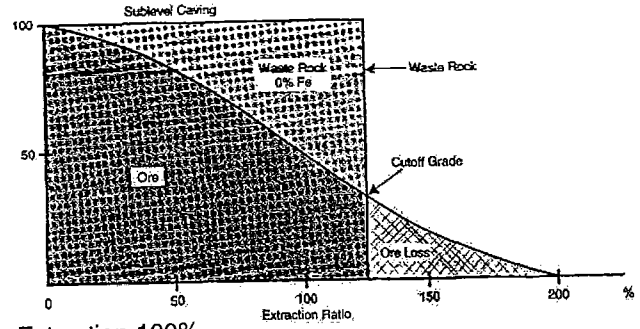


Figure Isometric view of the ore body of iron.

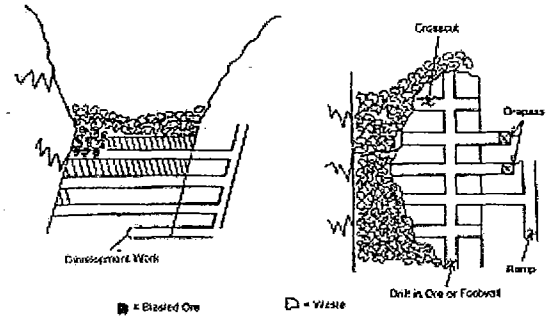
Answer:

Amount of ore per meter of cross-cut:20×3.5=70□□
Number of crosscuts per slice : 100
Length of crosscuts per slice : 100×100=10,000
Ore from crosscuts per slice = 10,000□ □20□ □×3.5=700,000□□
Number of sublevel caving rounds per slice : 10×10−20=80□ □
Amount of ore per blast : 80□ □×6□ □3.5=560□□



Extraction 100%

Figure Extraction round of sub level caving



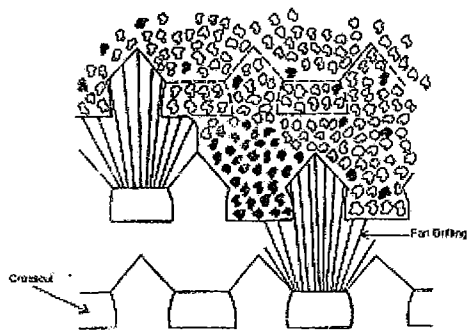


Figure (b) Sub level caving sequence

Loaded ore per blast : 75% or 420t
Loaded waste per balst : 25% or 140t
Total : 560 t

Total amount of rock from each blast in the sub level caving:

Ore: 560 t, of which 2×70=140 □□re from development work and 420 t are from sub level caving
Waste : 140 t
Total : 700 t
The ore needed per year is 3× 66−6 42−6=5 □ □□□□□□□
Necessary number of blasts per year : 5,000,000560=8929
Distance to develop per year = 8929 blasts per year x 2 m per blast = 17,858 m

Total amount per year:

Ore from development work :17,858×70□□ □1.25 □ □□□□□□□□□
Ore from sub level caving : 8929 blasts per year x 420 tons per blast =3.75 □ □□□□□□□□
Total Ore = 5.00 million t/a
Waste rock dilution: 8929 blasts per year x 140 tons per blast = 1.25 million t/a
Total amount to hoist = 6.25 million t/a
The amount of ore from development work will increase a little if the horizontal drift is placed in the ore body and not in the footwall. If a ore loss of 20% is considered and the waste rock dilution is also 20%. After taking the ore loss in account, the lifetime for 100m of the ore body will be:

$$\frac{100m \times 100m \times 1000m \times 3.5\frac{t}{m^2} \times 0.8}{5{,}000{,}000\ t\ of\ \frac{ore}{annum}} = 5.6\ years$$

The waste rock dilution means extra costs for handling 1.25 million t of waste rock per year.

Answer Key

1. (a)
2. (b)
3. (a)
4. (d)
5. (c)
6. (a)
7. (b)
8. (c)
9. (d)
10. (c)
11. (b)
12. (a)
13. (a)
14. (d)
15. (b)
16. (c)
17. (d)
18. (a)
19. (a)
20. (b)
21. (a)
22. (d)
23. (d)
24. (d)
25. (a)
26. (b)
27. (a)
28. (a)
29. (c)
30. (a)
31. (c)
32. (b)
33. (b)
34. (d)
35. (b)
36. Practice
37. (b)
38. (c)
39. (c)
40. (c)
41. (d)
42. (c)
43. (i) + c/(ii) + b, (iii) + d and (iv) + a
44. (i) + (c) (ii) + (a) (iii) + (d) (iv) +(b)
45. (i) + (c), (ii) + (d), (iii) + (b), (iv)+(a)
46. (a)
47. (d)
48. (d)
49. (a)
50. (a)
51. (b)
52. (c)
53. (c)
54. (a)
55. (c)
56. (d)
57. 4.5 to 4.518
58. (c)
59. (b)
60. 2.7 to 2.75
61. (a)
62. Practice
63. Practice

Chapter 11

Opencast/Surface Mining

1. **As per the provisions of MMR, 1961, mine plan of a mine having large opencast working shall be on a scale having a representative factor of –**
   (a) 200:1 (b) 2000:1 (c) 1000:1 (d) 4000:1

2. **Dept of the pit is 100m, pit slope angle is 45^0, and thickness of the ore body is 100m. If the depth of working increases by 10m, having same pit slope angle, what will be the ratio of waste to ore.**
   (a) 1.2 (b) 2.1 (c) 3.0 (d) 3.9

3. **To ensure safety in a very deep opencast coal mine, and also at the external dumps, instrumentation is being done to record slope stability:**
   (a) Seismograph (b) slope stability radar (c) geophone (d) None

4. **A tension crack of 5m depth behind a rock slope crest is completely filled with water. What is the horizontal force exerted on a unit slope length by the water in the tension crack.**
   (a) 122.60 kN (b) 245.00 kN (c) 12.26 MPa (d) 24.50 Nm

5. **In ultimate pit analysis the most widely used method is-**
   (a) dynamic programming (b) linear programming
   (c) simulation (d) heuristic technique

6. **Slope failure is a failure of-**
   (a) Benches in O/C mine (b) Failure of high wall
   (c) Failure of only one bench (d) All of the above

7. **Bench failure is caused by-**
   (a) Linear tension (b) Two tension on inclined direction
   (c) Tensions in multi direction (d) Overloading of the pillars
   (e) All of them

8. **A plane failure occurs due to-**
(a) Tension only (b) Compression only
(c) Both tension and compression (d) None of them

9. **In O/C mine bench failure has occurred in which a triangular portion has come out. The type of failure is-**
(a) Toppling up (b) Curved failure
(c) Wedge failure (d) Linear failure

10. **Commonly the following types of pit slope failure are-**
(a) Plane or Linear failure (b) Wedge or triangular failure
(c) Circular or curve failure (d) Toppling up or folding out
(e) All the above are true

11. **Linear failure or plane failure is due to-**
(a) Linear tension (b) Tension at two different direction
(c) Tension in multiple direction (d) Over loading of benches

12. **Triangular or wedge failure is due to-**
(a) Linear tension (b) Tension at two different direction
(c) Tension in multiple direction (d) Over loading of benches

13. **Circular failure is due to-**
(a) Linear tension (b) Tension at two different direction
(c) Tension in multiple direction (d) Over loading of benches

14. **Toppling up of benches is due to-**
(a) Linear tension (b) Tension at two different direction
(c) Tension in multiple direction (d) Over loading of benches

15. **Which type of dump design is considered to be the safest-**
(a) Plain dumping (b) Differential dumping
(c) Stage dumping (d) None of the above

16. **There are various methods of dump stability monitoring. The best one is-**
(a) GPS (b) DGPS
(c) Using survey instrument (d) SSR

17. **What is the best principle for prediction of dump failure at the early stage?**
(a) Changes in geometric shape and size of the dump
(b) Development of depression on top
(c) Initiation of crakes on sides
(d) By rate of displacement of point under consideration.

18. **In case of an O.C. mine, if the pit wall are too steep to allow suitable bends the layout of haul road geometry selected should be-**
(a) switch back (b) spiral
(c) zigzag (d) none of the above

19. **To open a mine for deep seated, the cut used is-**
(a) external box cut (b) internal box cut
(c) trench (d) deep cut

20. **Selection of a shovel bucket capacity depends on –**
(a) Muckpile profile (b) Dumper capacity
(c) Max. size of the fragment to be fed into the crusher (d) None

21. **A haul ramp of 6% grade is to be constructed connecting a bench of 15m height to the surface. If the cost of ramp construction is 1 million rupees per km, the cost of this ramp construction in million rupees will be-**
(a) 0.25 (b) 0.10 (c) 2.50 (d) 0.50

22. **Maximum permissible gradient for the haul road in opencast mines is-**
(a) 12^0 (b) 13^0 (c) 14^0 (d) 15^0

23. **Dumper arrives at a shovel at a constant rate of 10 per hour. The service rate is constant at 15 per hours. At a time, the expected number of dumpers in the queue is-**
(a) 2 (b) 3 (c) 5 (d) 4

24. **Pit Limit Optimization : Optimization techniques are as follows:**
(a) Heuristic technique (b) Dynamic programming
(c) Linear Programming (Integer Programming) (d) Network flow theory
(e) All the above

25. **Which one of the following term is not related to opencast mining?**
(a) Boxcut (b) Highwall (c) Crest (d) Winze

26. **Why diesel powered excavators are popular –**
(a) Flexibility in operation (b) Easy to operate
(c) Can handle oversize boulders (d) None

27. **Queuing at the shovel loading into dumpers are due to –**
(a) Poor fragmentation (b) Incidence of Toe
(c) Steep muckpile profile (d) All the above

28. **Maximum permissible gradient of a haul rod in the opencast mine is –**
(a) 12^0 (b) 13^0 (c) 14^0 (d) 15^0

29. Prior to starting opencast working some trenches are excavated to expose the mineral body. These trenches are generally very long but limited in depth. What is its approximate depth?
(a) 0.5 m (b) 1 m (c) 1.5 m (d) 2 m

30.. The slope angle for hard and compact ground should not be more than:
(a) 10° (b) 30° (c) 50° (d) 70°

31. In order to get better safety, the optimum gradient of a haul-road is-
(a) 1° – 3° (b) 5° – 9° (c) 15° – 19° (d) > 20°

32. Unless specially permitted by the Chief Inspector of DGMS, no road shall have a gradient steeper than-
(a) 1 in 3 (b) 1 in 6 (c) 1 in 10 (d) 1 in 14

33. The opening cut in opencast mining is known as-
(a) berm (b) box cut (c) trench (d) None of these

34. The effective position of box cut for a deposit, where ratio of OB : Ore is least should be-
(a) at boundary of mineral (b) at the middle of the boundary
(c) at high seam slope end (d) at any place

35. Which of the following equipment is very common for over casting of side casting?
(a) shovel (b) dozer (c) dragline (d) payloader

36. Stacker is commonly used to work in association with-
(a) dragline (b) bucket wheel excavator
(c) shovel (d) pay loader

37. In this method drilling, blasting in opencast mines is eliminated?
(a) dozer (b) shovel
(c) dragline (d) surface continuous miner

38. Which of the following excavator will be used for a bench height of 20 m to 30 m in soft rock formation?
(a) dragline (b) shovel
(c) pay loader (d) bucket wheel excavator

39. Which of the following excavator will be used for a bench height of 20 m to 30 m in soft rock formation?
(a) dragline (b) shovel
(c) pay loader (d) bucket wheel excavator

40. What is the minimum over burden production per day by a 10 m^3 electric rope shovel with 85 tonne dumper in India?
(a) 500 m^3 (b) 1500 m^3 (c) 4500 m^3 (d) 10000 m^3

41. How much time a dragline may take to complete a cycle for a single pass?
(a) 30 sec (b) 1 min (c) 1 min 45 sec (d) 3 min

42. Filling up of the void in opencast mines is known as-
(a) OB removal (b) trenching (c) reclamation (d) salvaging

43. Beach sand found in eastern coast is known as-
(a) gravel deposit (b) sedimentary deposit
(c) granite deposit (d) placer deposit

44. The process of underwater mining of sand, clay, tin and placer deposit of gold is known as-
(a) hydraulicking (b) dredging
(c) placer mining (d) leaching

45. Copper metal from ore is by :
(a) physical (b) mechanical
(c) leaching (d) physic-electrical

46. This factor indicates the e ratio of weight per unit volume of solid rock mass in the bench and weight per unit volume of loose rock mass after blasting or loosening is termed as:
(a) bucket factor (b) swing factor
(c) powder factor (d) swell factor

47. What is the standard of lighting required for the workplace of HEMM's of opencast mine?
(a) 2 lux (b) 3 lux (c) 4 lux (d) 5 lux

48. A lease holder cannot abandon a mine or part unless
(a) form C & D is submitted to Regional Controller of Mines, of IBM
(b) final mine closure plan is submitted and approved by Regional Controller of mine
(c) progressive mine closure is submitted to controller general
(d) up to date mine plan is submitted to DGMS

49. Which of the following factor is considered for calculation of cycle time of any excavating machine such as shovel, drag line etc?
(a) swell factor (b) bucket factor
(c) swing factor (d) drill factor

50. Which of the following unique mining method is known as novel method?
(a) opencast mining (b) methane drainage
(c) bord and pillar (d) long wall

51. The range of application of hydraulicking is mostly limited to-
(a) hard rocks (b) placers (c) coal (d) soft rocks

52. The flow rate of water in hydraulic mining for coal should be at least A gallon per minute. A is given by-
(a) 50 (b) 100 (c) 200 (d) 300

53. The following nomenclature 20/90 for a dragline is related to-
(a) bucket capacity & maximum reach (b) loading capacity & height
(c) bench height and weight (d) none of these.

54. A dragline is required to remove 3,00,000 m^3 of rock per month on the bank volume basis. Consider the following data for the dragline operation.
Effective working hours per month = 450
Bucket fill factor = 0.8
Cycle time = 65 s
Swell factor of the rock = 1.25
The minimum bucket capacity of the dragline in m^3 is –
(a) 7.70 (b) 9.63 (c) 12.04 (d) 18.80

55. Match the following in the context of Indian mining practice :

Equipment	Power source
P-Rocker shovel	1. Battery
Q-Locomotive	2. Compressed air
R-Shearer	3. electricity (max. V of 6.6kV AC)
S- Dragline(24m^3 bucket cap.)	4. Electricity(max. V 1.1kV AC

(a) P-1, Q-2, R-3, S-4 (b) P-2, Q-1, R-4, S-3
(c) P-2, Q-1, R-3, S-4 (d) P-1, Q-3, R-2, S-4

56. Given bench height : 12m, burden -4m, spacing-5m, explosive per hole-120kg, density of rock – 2600kg/m^3,b the powder factor in tonne/kg is –
(a) 2.0 (b) 4.6 (c) 5.2 (d) 7.3

57. Match the following in the context of Indian mining practice –

Equipment	Slice thickness(m)	Action
P-Dragline	1.6-12	a. Crowding
Q-Shovel	2. 30-40	b. Hoisting
R-Surface Miner	3. 0.2 – 0.4	c. Cutting

(a) P-1-b, Q-2-a, R-3-c (b) P-2-b, Q-1-a, R-3-c
(c) P-2-b, Q-1-b, R-3-c (d) P-2-b, Q-3-c, R-1-1

58. If the value of the ore is Rs.600 per tonne, production cost Rs.400 per tonne and cost of overburden removal Rs. 50 per m^3, the break-even stripping ratio in m^3/tonne is –
(a) 4:1 (b) 3:1 (c) 1:3 (d) 1:4

59. Total number of injuries in an opencast ccoal mine employing 800 persons is 16 in a year. As per DGMS norms, the injury rate per 1000 persons employed is –
(a) 13 (b) 15 (c) 20 (d) 25

60. Truck Despatch System (TDS) is being introduced for the following –
(a) Better productivity (b) Tracking dumper movement
(c) Quality control (d) All the above

61. In a surface mine blast, the peak particle velocity (V in mm/s) is estimated from the equation$V=120(\sqrt{SD})^{-10}$, where SD is square root scaled distance. If at a distance of 100 m from the blast site the permissible peak particle velocity is 25 mm/s, the maximum charge per delay in kg. is –
(a) 404 (b) 414 (c) 434 (d) 464

62. A surface mine blast design has 9 holes in a row, each of 8m length and 200mm diameter. The spacing and burden are 6m and 5 m respectively. The length of sub-grade drilling is 1 m and the density of in-situ rock is 2.43t/m^3. Assuming no back break, the output per blast is in t is –
(a) 5593 (b) 5905 (c) 6124 (d) 6299

63. A surface mine blast design has 9 holes in a row, each of 8m length and 200mm diameter. The spacing and burden are 6m and 5 m respectively. The length of sub-grade drilling is 1 m and the density of in-situ rock is 2.43t/m^3.Considering an explosive density of 0.9 t/m3 and stemming length of 2 m, the powder factor from the blast in t/kg is –
(a) 4.12 (b) 4.00 (c) 3.86 (d) 3.01

64. High wall mining technique is currently in operation at –
(a) Sharda OCP (b) Jagannath OCP (c) Kusmunda (d) None

65. Some of the major deficiencies with Auger mining in opencast mining are–
(a) Low recovery of coal (b) Not for seams thicker than 1.8m
(c) Limited depth of penetration to 125m (d) All the above

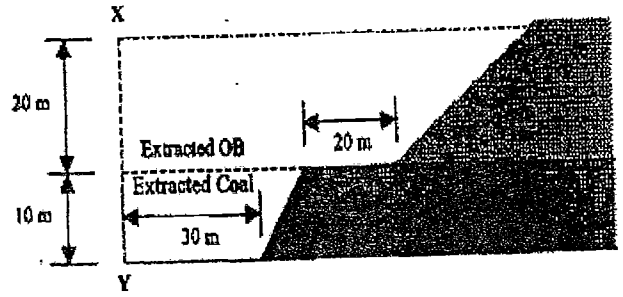
66. High wall mining has bneen successful for the extraction of –
(a) Thick seams being worked by shovel dumper combination
(b) Coal blocked in the boundary of the opencast mine
(c) Coal susceptible to spontaneous combustion
(d) None of the above

67. **High wall miner is fitted with a ..... Sensor which measure the percentage of ..... and displays the same in the monitor being kept in front of the Operator at the surface.**
Ans : Methane, Methane

68. **In the operation oif a high wall miner, in the event of the Methane level concentration exceeds ..... %, it will trip the electrical supply feeding to the cutter unit.**
Ans. 1.25%

69. **High wall mining enables to excavate coal –**
(a) by blasting (b) by surface miner (c) by a man less cutter (d) None

70. **In an opencast mine shown in the figure below the coal has density of 1.4 tonne/m³. Assuming mining operations started from plane XY, the operating stripping ratio under the given conditions in m³/tonne is**



(a) 2.32 (b) 2.47 (c) 2.56 (d) 2.64

Answer Key

1.	(d)	15.	(c)	29.	(d)	43.	(d)	57.	(a)
2.	(a)	16.	(d)	30.	(d)	44.	(b)	58.	(c)
3.	(b)	17.	(d)	31.	(b)	45.	(c)	59.	(c)
4.	(a)	18.	(b)	32.	(d)	46.	(d)	61.	(c)
5.	(d)	19.	(b)	33.	(b)	47.	(d)	62.	(a)
6.	(d)	20.	(c)	34.	(b)	48.	(b)	63.	(d)
7.	(e)	21.	(a)	35.	(c)	49.	(c)	64.	(a)
8.	(a)	22.	(c)	36.	(b)	50.	(b)	65.	(d)
9.	(c)	23.	(a)	37.	(d)	51.	(b)	66.	(b)
10.	(e)	24.	(e)	38.	(d)	52.	(d)	67.	Methane, Methane,
11.	(a)	25.	(d)	39.	(d)	53.	(a)		
12.	(b)	26.	(a)	40.	(c)	54.	(d)	68.	1.25%
13.	(c)	27.	(d)	41.	(c)	55.	(b)	69.	(c)
14.	(d)	28.	(c)	42.	(c)	56.	(c)		

Chapter 12

Mineral Economics & Mine Management (General)

Mineral Economics

1. **A balanced transportation problem is characterized by –**
(a) total supply exceeds total demand (b) total demand exceeds total supply
(c) total demand is equal to total supply
(d) total supply is either equal to or more than the total demand

2. **In the context of project management techniques, the true statement is –**
(a) CPM is stochastic and PERT is deterministic
(b) CPM is deterministic and PERT is stochastic
(c) Both CPM and PERT are deterministic
(d) Both CPM and PERT are stochastic

3. **There are 50 lemon trees in a reclaimed mine area. Each tree produces 800 lemons per year. For each additional tree planted in this area, considering all trees, the output number of fruits per tree drops by 10 lemons in a year. The number of trees that t be added to the existing reclaimed area in order to maximize the total number of lemons in the year is**
(a) 10 (b) 15 (c) 16 (d) 26

4. **Consider the following liner programming problem:**
Maximize $z = 3x + 2y$

s.t. $3x + 2y \geq 15$

$2x + 3y \leq 6$

$x \geq 0, y \geq 0$

The above liner programming problem has
(a) Unique optimal solution (b) Multiple optimal solution
(c) Unbounded solution (d) Infeasible solution

5. **A mine workshop has 4 lathe machine and 4 tasks for completion. Each of the machines can perform each of the 4 tasks. Each task can be assigned to one and only one machine. Estimated cost in rupees to complete each task is given in the matrix below.**

Machine / Task	M1	M2	M3	M4
T1	61	92	52	72
T2	42	49	69	85
T3	47	59	80	71
T4	65	70	68	72

The total optimum cost in Rupees for assigning the tasks to the machine is
(a) 210 (b) 215 (c) 220 (d) 286

6. **Workmen arrive at a mine workshop to receive tools for maintenance. The inter-arrival time of workmen at the service counter is exponentially distributed with an average time of 10 min. The service time at the counter is also distributed exponentially with a mean time of 6 min. The probability that there is a queue (more than one workman) at the service counter is**
(a) 0.24 (b) 0.36 (c) 0.40 (d) 0.60

7. **In the above problem, the average time spent by a workmen waiting for his turn to be served in min. is**
(a) 9 (b) 12 (c) 15 (d) 18

8. **In PERT network, the activity duration is assumed to follow**
(a) Beta distribution (b) Normal distribution
(c) Binomial distribution (d) Weibull distribution

9. **For an LP problem, identify the incorrect statement**
(a) Optimal point lies in one of the corner points
(b) Objective function is linear (c) All the constraints are linear
(d) Optimal point lies in any one of the interior points of the feasible region.

10. **Four mines A, B, C and D are located along a road as shown with production in Mt per year 1, 2, 1 and 3 respectively. In order to handle total coal produced, the ideal distance of a coal washery along the road from the mine A in Km is**

(a) 4.1 (b) 3.91 (c) 3.81 (d) 3.71

11. **The solution of the following system of linear equation is**

$x + 4y + 3z = 0$

$3x + 5y + 2z = 0$

$8x + 10y + 12z = 0$

(a) (0, 0, 0) (b) (1, -1, 1) (c) (2, -1, -2) (d) (-3, 0, 1)

12. **A system of two identical mine pumps were to connected in series has reliability 0.49. If the pumps were to be connected in parallel, the reliability would be**
(a) 0.21 (b) 0.60 (c) 0.91 (d) 0.95

13. **Unit cost of matrix of a transportation problem is given below in certain monetary units.**

Destination / Source	1	2	3	
1	2	2	8	15
2	1	5	7	40
3	6	4	3	20
	10	25	40	Demand
				Supply

The total cost of transportation based on the initial basic feasible solution obtained by the North-West corner rule is

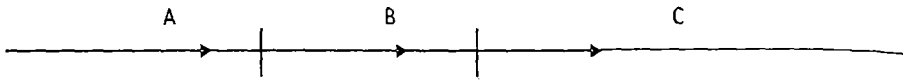
(a) 250 (b) 290 (c) 330 (d) 360

14. **The optimal solution for the transportation problem has allocation as shown below:**

Destination / Source	1	2	3	
1		15		15
2	10	10	20	40
3			20	20
	10	25	40	Demand
				Supply

Where compared to initial basic feasible solution from the above, the optimal allocation results in savings of
(a) 10 (b) 20 (c) 30 (d) 40

15. **A mining project comprising of A, B and C activities is scheduled for 90 days at a cost of ₹1200 million. The manager of the project decides to reduce the time for completion of the project to 85 days. The decision was taken after 45 days.**



Activity	A	B	C
Duration (days)	40	15	35
Crashing cost/day (million rupees)	15	25	20

The minimum cost of the project in million rupees after crashing 5 days is
(a) 100 (b) 1300 (c) 1475 (d) 1825

16. **The assignment problem given requires four different jobs to be done on four different machines. The minimum cost of assignment is .....**

Job	Machine			
	M_1	M_2	M_3	M_4
J_1	27	35	36	30
J_2	33	37	36	35
J_3	30	26	28	24
J_4	38	29	35	33

17. **The failure data of an equipment follows an exponential distribution. If the mean time between failures is 3000 hrs, the reliability of the equipment for 750 hours is.....**

18. **The covariance of copper grade for a certain lag distance in an ore body is 6.0(%)². If the sill is 10(%)², the semi-variogram for the same lag distance in (%)² is –**
(a) 4.0 (b) 16.0 (c) 2.0 d) 64.0

19. **The initial investment for a small scale mining project is ₹ 5.0 crore. Annual cash in flow for a life period of 4 years is given below :**

Year	Cash inflow(crore)
1	1.5
2	2.0
3	2.0
4	1.5

The net present value of the project at an annual discount rate of 10% in crore is.....

20. **Given the following linear programming problem.**
Maximise $z=3x_1 + 4x_2$ subject to
$2x_1 + x_2 \le 6$
$2x_1 + 3x_2 \le 9$
$x_1 \ge 0\ x_2 \ge 9$
The corner point feasible solution in terms of (x_1, x_2) is
(a) (1.5,0) (b)(1.25,1.5), (c) (0.5, 1.0), (d) (2.25, 1.5)

21. **Rock bolts have length L=(150+X)cm, where X is a random variable with probability function**

$$f(x)=\begin{cases}\frac{1}{4}(1-3x), & \text{if } -2\le x\le 2\\ 0, & \text{otherwise}\end{cases}$$

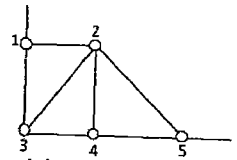
If 95% of the bolt lengths (L) lie in the interval 150-c cm to 150+c cm, the value of c is -

22. **The properties for a bivariate distribution of two random variables X and Y are given below :**
E(X) =24, E(Y) =36, E(X²)=702, E(Y2)=1524, E(XY)=1004
The correlation coefficient between X and Y is _____

23. **Payback period is time required**
(a) for the cash income from a project to get back the initial cash investment
(b) from the start of the project to the time to recover the total initial investment
(c) from the start of the project to the start of production
(d) to the period during which internal rate of return is generated.

24. **A flat bauxite deposit has thickness of 10 m with an average density of 2200 kg/m³. The grade values and the sample coordinates are as shown in the table. To carry out reserve estimation using triangular method, the triangles are constructed as shown in the figure.**

Sample No	1	2	3	4	5
Alumina%	35	40	3	47	42
x coordinate, m	0	200	0	200	500
y coordinate, m	30	300	0	0	0



The alumina content in million tonnes, in the region comprising the three triangles is

25. **Block economic values in Lakhs of ₹ for a section of a block economic model are shown below.**

-1	-1	1	-1	0	-1
-1	0	0	0	-1	-2
-5	-3	-2	5	-2	-3

At a permissible slope angle of 1:1, the optimum pit value of the section in Lakhs of ₹ is

(a) 0 (b) 1 (c) 2 (d) 3

A-1 : Economic analysis of an iron ore deposit reveals that the net value of the ore is related to the grade mined as shown in the table.

Grade (5 Fe)	Net value of ore (Rs./tone
64.5	3200
60.2	1800

27. **Assuming linear relationship between the net value and grade, the break-even cut-off grade in % Fe is -**

(a) 52.2 (b) 54.7 (c) 58.0 (d) 62.2

28. **Assuming that the grade follows normal distribution with mean 62.7%, and standard deviation 10.0% (A portion of the standard normal distribution table is given below),**

z	0.00	0.01	0.02	0.03	0.04
0.6	0.72575	0.72907	0.73237	0.73565	0.73891
0.7	0.75803	0.76115	0.76424	0.76730	0.77035
0.8	0.78814	0.79103	0.79389	0.79673	0.79954
0.9	0.81594	0.81859	0.82121	0.82381	0.82639
1.0	0.84134	0.84375	0.84613	0.84849	0.85083

the percentage of waste in the deposit based on the break-even cut-off grade is

(a) 78.8 (b) 71.2 (c) 28.8 (d) 21.2

29. **The number of ways in which the letters in the word MINING can be arranged is**

(a) 90 (b) 180 (c) 360 (d) 720

30. **Identify the correct statement for a 'normal distribution'.**

(a) Mean is greater than mode but less than median
(b) Mean is less than mode but greater than median
(c) Mean is greater than mode and median
(d) Mean, median and mode are equal

A-1 Common Data for Questions 31 & 32 :
A concentrator pilot plant is fed with 1 tonne of copper ore at ROM grade o 1.5 % Cu. Metal recovery in the concentrator pilot plant is 90% and the grad of copper in concentrate is 20%.

31. **The amount of copper in concentrate in kg is :**

(a) 13.5 (b) 14.0 (c) 14.5 (d) 15.0

32. **Amount of concentrate produced from 1 tonne of ore in kg is**

(a) 75.0 (b) 72.0 (c) 70.0 (d) 67.5

33. **The time study data of an equipment deployed in a mine during a calendar month is given below.**

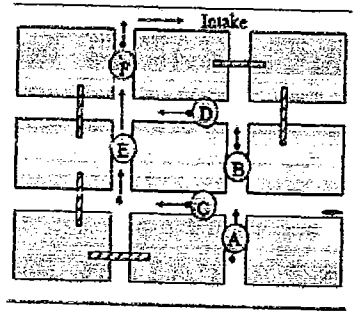
Total working hours = 400
Total maintenance hours =100
Total hours of actual work =240

(a) 85 (b) 80 (c) 65 (d) 60

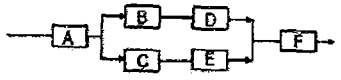
34. **For an oil exploration drilling, chance of striking an oil reservoir is 1 out of 15. If an oil exploration company decides to explore 5 sites, the probability of striking at least one successful oil reservoir is**

(a) 0.292 (b) 0.250 (c) 0.034 (d) 0.0024

35. **A sudden increase of CO incidence has occurred in an underground mine section. A man at point A starts to run out to the main intake of the mine where he will be safe.Refer figure below for the mine section and the logic diagram. The probabilities that he will successfully cross the gallery sections A, B, C, D, E, and F are 0.9, 0.8, 0.7, 0.8, 0.7 and 0.9 respectively. The probability that he will successfully reach the main intake is**



Section of the mine



Series-parallel logic diagram

(a) 0.40 (b) 0.51 (c) 0.66 (d) 0.77

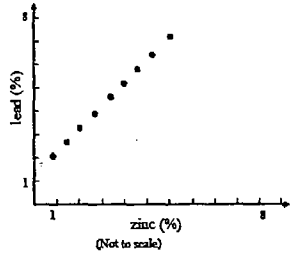
36. **ISO 9000 Quality Systems DO NOT contain**
(a) legal provisions (b) measurement
(c) document control (d) standardization

37. **The sale value of chromite ore from an open pit mine is ₹6500 per tonne. Cost of mining, excluding stripping cost, is 2450 per tonne. If the cost of stripping is Rs. 1150 per m3, the breakeven stripping ratio in m3/tonne is**
(a) 2.18 (b) 3.52 (c) 3.65 (d) 4.25

38. **An investment at 10% yearly interest rate, compounded quarterly, accumulates to a sum of 120,000 in 5 years. The present value of the sum in rupees is**
(a) 72,233 (b) 74,511 (c) 88,232 (d) 106,063

39. **The thickness of a coal deposit is represented by a spherical semi-variogram model with sill of 5 m^2. If the semi-variogram value at lag distance *h* is 3 m^2, the correlogram value at the same lag distance is**
(a) 0.40 (b) 2.0 (c) 2.5 (d) 5.0

40. **A scatter plot prepared using a set of values of lead and zinc from a lead-zinc deposit is shown in figure below. The value of correlation coefficient is**



(a) 1.0 (b) 0.7 (c) 0.5 (d) 0.00

41. **A mining equipment has a life of 5 years with no salvage value. Assuming that the depreciation of the equipment is calculated by the straight line method, the average annual value of the equipment percentage of its original value is**
(a) 20 (b) 40 (c) 50 (d) 60

42. **The cash flow table of a manganese mine for a particular year is shown below:**

Item	Amount (Rs. in Lakhs)
Revenue	900
Cost (other than depreciation)	300
Depreciation	100
Profit before tax	500

If the corporate tax is 50% of the profit before tax, operating cash inflow in lakhs of rupees is
(a) 400 (b) 350 (c) 250 (d) 200

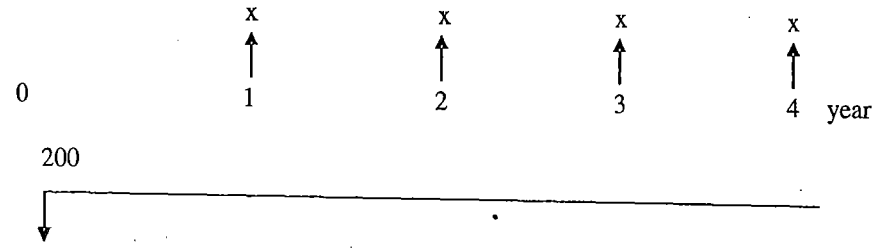
43. **In a mine site, the cost of shaft sinking in lakhs of urpees is given as 2.64D + 34.8, where D is the shaft depth in m. in the same site, the corresponding cost of driving an incline is 0.96L, where L is the length of the incline in m. Assuming L by D ratio is 3.0, the depth in m beyond which the shaft sinking becomes more 3 economical is**
(a) 43 (b) 48 (c) 145 (d) 155

44. **The following information is provided for an ore deposit :**

Number of waste blocks	= 10
Number of ore blocks	= 5
Volume of each waste block, m3	= 600
Total cost of waste handling per m3	= ₹. 100
Tonnage of each ore block	= 400
Total cost of ore handling per ton	= . 150
Sale price of ore per ton	= 500

The net cost flow of mining the deposit in lakhs of rupees, is
(a) 3.4 (b) 2.5 (c) 1.0 (d) 0.8

45. **A cash flow diagram is shown below, Based on NPV, at 10% rate of interest, the minimum annuity x at which the investment becomes viable is**



(a) 63 (b) 54 (c) 42 (d) 35

46. **A coal mines receives two bids for purchase of a new dragline. The first bid quotes Rs 150 crore as a price to be paid in full on delivery. The second bid quotes Rs. 180 crore as a price payable at the end of the third year after delivery. If the discount rate is 12%, the difference in NPV between the first and second bids in crore of rupee is** _____

47. **In a PERT network, the activities on the critical path *a,b* and *c*. The standard deviations of the durations of these activities are 2, 2 and 1 respectively. The variance of the project duration is**
(a) 3 (b) 5 (c) 9 (d) 12

48. **Discounted cash flow techniques, include -**
(a)Net present value (NPV) (b)Internal rate of return (IRR)
(c) Profitability index (PI) (d)All of the above

49. **Pay back period is calculated taking into account –**
a) Initial investment b) Annual cash inflow
c) Present value d) None of the above

50. **Value of Bulking Factor is**
(a) 0 (b) 0.5 (c) 1 (d) more than 1

51. **It is the part of cost of the fixed asset to owner which is treated as loss in value of capital?**
(a) fixed capital (b) depreciation
(c) liability (d) depletion allowance

52. **The ratio of current assets to current liability is known as**
(a) quick ratio (b) assessment ratio
(c) liquidity (d) profit ratio

53. **Which of the following is called ROI?**
(a) $\frac{profit\ X\ 100}{capital\ employed}$ (b) $\frac{profit\ X\ 100}{sales}$
(c) $\frac{profit\ X\ 100}{profit}$ (d) capital turn over rate

54. **Which of the following is in vogue to calculating depreciation?**
(a) budgeting control method (b) straight-line method
(c) industries sickness control method (d) cost control rechnique

55. **In sampling, a part is collected to represent the total set of observation. Use any single word from the following to replace "total set of observation"**
(a) variance (b) distribution
(c) population (d) deposition

56. **Which of the following sampling technique is followed during sampling from wagons or dumps in the form of scoop taken at regular intervals?**
(a) chip sampling (b) borehole sampling
(c) bulk sampling (d) grab sampling

57. **When the occurrence of mineral (e.g. rare minerals) is randomly distributed in a rock then which of the distribution pattern is statistically followed?**
(a) normal distribution (b) skewed distribution
(c) lognormal distribution (d) poisson distribution

58. **A sample of 144 items gives a mean value of 45, with a standard deviation of 3. Calculate symmetric confidence limits within which the true population lies with 95% confidence?**
(a) 41.5 and 42.5 (b) 42.5 and 43.5
(c) 43.0 and 43.5 (d) 44.5 and 45.5

59. **The point beyond which the mineral/coal not be economically extracted is called**
(a) stripping ratio (b) cost of stripping ratio
(c) break-even ratio (d) limit of extraction

60. **What is the relationship between break-even stripping ratio (BESR) and ordinary stripping** ratio (OSR)?
(a) BESR < OSR (b) BESR = OSR (c) BESR > OSR (d) no relation

61. **The current OMS is Indian underground coal mine is**
(a) 0.56 (b) 0.96 (c) 1.46 (d) 2.0

62. **It is one of the capital budgeting project indicating the discount rate at which net present value of a project become zero**
(a) net present value (b) payback period
(c) internal rate of return (d) cash flow period

63. **It is one of the capital budgeting project indicating the discount rate at which net present value of a project becomes zero**
(a) IRR (b) CCF (c) CFT (d) ERP

64. **Facilitating flow of information between all business functions inside the boundaries of the organization and managing connections to outside stakeholders. Which of the following can explain this?**
(a) job evaluation technique (b) enterprise resource planning
(c) break even analysis (d) management information system

65. **What can be calculated by using the following relation ship**

F — $\frac{f}{1-\frac{V}{P}}$ F is the fixed cost;
V — V is variable cost/unit
P — P is selling price of each unit

(a) order of importance (b) breakeven point
(c) ranking preference (d) finding dividends

66. **Which of the following costs are used in determining price of the products, accepting an offer or in decision making on replacing machinery etc?**
(a) differential cost (b) marginal cost
(c) incremental cost (d) standard cost

67. **It is a versatile computer based system having wide spread application in the analysis of stochastic system that are too complex to be presented by mathematical formula.**
(a) neural network (b) system simulation
(c) graphic console (d) operations research

68. **With – the organization can experience increased efficiency, productivity while problems of management is reduced to a great extent. Fill up the blank with suitable word.**
(a) information technology (b) strategies
(c) professional attitude (d) outsourcing

69. **Monitoring overall level of socio-economic development, is following this index.**
(a) human development index (HDI) (b) HAZOP index
(c) CSR index (d) health monitoring index (HMI)

70. **HDI combines three factors where life expectancy and income are the two which one of the following is the third?**
(a) education (b) housing (c) health (d) literacy

71. **Which of the following is treated as one of the important input of planning and decision making?**
(a) resource allocation (b) scheduling
(c) forecasting (d) capital budgeting

72. **Capacity vulnerability analysis (CVA) framework from a simple matrix constituting three broad areas. If physical/material and social/organizational are the two then which is the** third area?
(a) environment/health (b) motivational/attitudinal
(c) skill/labour (d) financial/technological

Mineral Conservation, Environment

73. **As per the MMDR Amendment Act 2015 - National Mineral Exploration Trust to be set up for impetus to exploration.**
True/False

74. **As per the MMDR Amendment Act 2015 - Uniform lease period of ..... years; no renewals; auction at the end of lease period; will solve problems arising out of SC judgments on second and subsequent renewals**
(a)20 (b) 50 (c) 30 (d) none of these

75. **As per the MMDR Amendment Act 2015 – it makes it mandatory to establish a District Mineral Foundation (DMF) in all districts where mining takes place. This is designed to address a long time grievance of civil society that people affected by mining are not cared for. Contribution to the DMF of an amount not exceeding ..... of the royalty rate in so far as new concessions to be granted by auction are concerned and not exceeding the royalty in respect of existing concessions has been provided for.**
(a) Half (b) One Fourth (c) One Third (d) None of these

76. **As per MCDR 1988 the removed top soil shall be kept separately and utilized for the purpose of**
(a) prospecting of land (b) restoration and rehabilitation
(c) protection of flora and fauna (d) prevent tailing disposal

77. **Disturbance and displacement of fauna is mainly caused by**
(a) noise (b) air contamination
(c) silting and reagents (d) acid drainage

78. **Which of the following action minimizes the negative impacts of mining industry?**
(a) internal monitoring (b) compensation payment
(c) R&R(rehabilitation and resettlement policy)
(d) infrastructural activities

79. **Restoration, reclamation and rehabilitation of land shall be completed**
(a) after abandoning the mine (b) before abandoning the mine
(c) before handing over to NGO's (d) prior to opening up a new mine

80. **Due to which of the following operation, road, railway lines even townships are disturbed and some of these facilities are to be shifted causing problems to man?**
(a) extensive mining (b) unorganized mining activity
(c) acid mine drainage (d) subsidence

81. **Which of the following has undergone the most processing (has been through the most changes from when it was found in the ground).**
(a) alloy (b) rock (c) metal (d)ore

82. **Acid Mine Drainage (AMD) does not normally occur in areas before mines are built but tends to happen after the mine has been in operation for many years. What causes AMD?**
(a) Concentrated acids used to dissolve metals from the rock are picked up in rainwater
(b) Mining exposes un-weathered rock surfaces that react with water and the atmosphere to generate acids.
(c) Abandoned mining equipment leaks acids from batteries.
(d) The acid is already present in trapped underground pockets and is released by mining equipment.

83. **Which of these is NOT a use for materials mined from Earth ?**
(a) Fertilizers
(b) Nuclear power
(c) cell phone
(d) all the above are from mined materials.

84. **Reclamation (restoration) of mined areas to their pre-mined condition has been difficult in India because**
(a) mining companies do not provide money and all efforts are funded through tax collection
(b) experts with knowledge of restoration and ecology are not consulted during reclamation efforts
(c) fast-growing plants used in the early stages of reclamation to prevent erosion may impede the growth of other plant species that would be needed for a diverse ecosystem
(d) None of these; most closed mines are now no different from the surrounding undisturbed habitat.

85. **Which type of mining causes large amounts of sediment and debris to choke rivers and streams as its main environmental impact?**
(a) opencast mining
(b) placer mining
(c) solution mining
(d) underground mining

86. **Mine tailings are .....**
(a) the product of metal smelting
(b) the final portions of rich veins of minerals found in subsurface mining; when the "tailings" are reached, a new shaft is dug to find a new mineral vein
(c) the name given to the malformations seen in birds that have been poisoned in open pit mines
(d) the remains of ore after most of the metals have been removed

87. **Tailings Dams are earthen dams built in the mineral processing circuit to store .....**
(a) Fine rejects mixed with water
(b) overburden waste
(c) water
(d) none of the above.

88. **The impact of this environmental component is on the ecosystem comprising both flora and fauna. What is that component?**
(a) biota
(b) animal excreta
(c) mine tailings
(d) heavy metals

89. **What is the full form of TOC?**
(a) total oxygen consumed
(b) toxicity of carbon
(c) total organic carbon
(d) turbidity oil content

90. **Which of the following is known as "effluent polishing"?**
(a) it is settle out biological flock through a secondary classifier
(b) it is to provide final treatment stage to raise effluent quantity before dischargec where disinfection is practiced.
(c) it is final treatment stage of treatment to raise effluent quality where disinfection is not practiced.
(d) it is the effluent treatment done with ultraviolet.

91. **With the help of soil bio-technology (SBT) process, the level of COD can be brought down to as minimum as "A" mg/L from sewerage input of COD 400 mg/L. A is given by**
(a) 10 mg/L (b) 20 mg/L (c) 40 mg/L (d) 60 mg/L

92. **Which of the following is not used as common method of disinfection?**
(a) ozone
(b) chlorine
(c) sodium hypochlorite
(d) chloramines

93. **It is of such infection treatment of waste water that is practiced is North America having a disadvantage of generating an organic compound that may be carcinogenic or harmful to the environment. Identify it.**
(a) secondary sedimentation
(b) radiation
(c) chlorination
(d) filter clogging

94. **"MBBR" typically requires foot print in the sewerage process. What is the full form of MBBR?**
(a) membrane of bio basin rectors
(b) moving bed biofilm reactors
(c) manure bedded biological rate
(d) medium biomass brine reagent

95. **.....Plan is has been incorporated few years back, and is an integral part of any Mine Planning exercise :**

96. **The National Green Tribunal has been established on 18.10.2010 under the .....Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues.**

97. **Environmental Management Plan (EMP), does not contain this aspect –**
(a) EIA(Environmental Impact Analyses) (b) Forest Clearance
(c) Pollution Control (d) None of the above

98. **Use of beneficiated/blended coal containing ash not more than 34 percent in power plants was stipulated as mentioned below -**
- for power plants located beyond ..... (A) km. from pit head
- Power plants located in critically polluted areas, urban areas and in ecologically sensitive areas

99. **CSR** means_____

100. **Soluble organisms represented by high "A" waste causes depletion of O_2 in the surface water that results in fish kills and undesirable changes in aquatic life. A is given by**
(a) BOD (b) toxic
(c) mineral effluents (d) loss of bio-diversity

101. **In 1990 clean air act, the air toxic category includes A number of specific chemicals having relevance in air quality impact study. A is given by**
(a) 185 (b) 187 (c) 189 (d) 191

102. **In order to save mining environment no plant for screening or sorting of coal, no heap of cinder, sand is allowed to be placed within – m of the top of DC shaft or intake airway.**
(a) 40m (b) 60m (c) 80m (d) 120

103. **"Net national welfare (NNW)" - who advocated this novel concept?**
(a) Barrett (b) O'Riordan (c) Munn (d) Shigarotsure

104. **Gross domestic happiness (GDH) refers to which index?**
(a) index of market price (b) index of poverty
(c) index of progress (d) index of literacy

105. **Which Govt. has introduced the GDH index?**
(a) Sikkim (b) Assam (c) Jharkhand (d) Bhutan

106. **" Loss accruing from accident, pollution, deterioration of values of life is to be estimated" – who gave this concept?**
(a) Prof. Shigarotsuru (b) Dr. Heather Ucgynski
(c) Alan Stoneman (d) McAllister

107. **Failure analysis - it is a top down deductive failure analysis where undesired state of a system is analysed using Boolean logic to combine series of lower level events**
(a) hazard analysis (b) cognitive analysis
(c) fuggy logic analysis (d) fault tree analysis

108. **It is the science to determine workload with respect to anthropometric dimension of human.**
(a) psychology (b) ergonomics
(c) sociology (d) anthropology

109. **The basic impact area, associated with predicting and assessing impacts on the socio-economic environment is called**
(a) region of influence (b) triple bottom line
(c) communication on progress (d) socio-cultural impact

110. **Health impact assessment (HIA) is undertaken by a specialist consultant and the output is known as**
(a) pre-feasibility study (b) scoping
(c) health impact assessment (d) health hazard identification

Energy Management

111. **Energy Conservation Act, 2001 was enacted for energy conservation in all segments. This Act is being implemented through**
(a) DGMS (b) CIMFR (c) BEE (d) None of the above

112. **Buerau of Energy Efficiency, under the Min. of Power, Govt. of India, has been overseeing Energy Conservation Act, 2001 & Energy Conservation (Amendment) Act 2010, and have entrusted its regulation through –**
(a) State Designated Agencies (SDA) (b) Electricity Boards
(c) CIMFR (d) None of the above

113. Energy Audit will benefit all major consumers of energy, whether fossil fuel or electricity to ensure proper use of energy.
True/False

114. Designated consumers with respect to Energy Conservation Act 2001, also includes –
(a) Mining (b) Steel (c) Fertilizers (d) All the above

115. This national level CSIR Laboratory is engaged in 'energy audit' in Mining sector –
(a) CIMFR (b) PCRA (c) Coal India (d) None

116. Energy conservation in mine ventilation fans, can be done by –
(a) Stoppage of ventilation fan
(b) Reducing the weight of fan blades with alternate material
(c) Reducing the motor RPM (d) None of the above

117. In dumper operation, specific fuel oil consumption can be controlled by –
(a) Proper selection of lubricants for engine
(b) Proper maintenance of haul rodas
(c) Adopting Truck Despatch System
(d) All above

118. Power Factor improvement can be done by –
(a) Installing capacitor banks
(b) Adopting switch ON system in a regulated manner
(c) Capacitor to be installed near to the load
(d) All the above

119. Which Motor improves power factor –
(a) Induction Motor (b) Slip Ring Motor
(c) Synchronous Motor (over excited) (d) None of the above

120. Energy Conservation Day is celebrated on this date every year –
(a) 14th Nov (b) 14th Dec (c) 14th Jan (d) 14th Feb

121. This system of Mining in opencast is energy efficient
(a) Continuous surface miner (b) Shovel dumper
(c) Dragline (d) None of the above

122. This is not a Non-Renewable Source of Energy –
(a) Solar (b) Wind (c) Coal (d) Hydro

Answer Key

1. (c)
2. (b)
3. (b)
4. (d)
5. (c)
6. (d)
7. (a)
8. (a)
9. (d)
10. (d)
11. (a)
12. (c)
13. (c)
14. (d)
15. (b)
16. 116
17. 0.75 to 0.81
18. A
19. 0.5 to 0.6
20. (d)
21. 1.88 to 1.92
22. 0.8 to 0.85
23. (b)
24. 0.9 to 1.0
25. (c)
26. (d)
27. (b)
28. (d)
29. (b)
30. (d)
31. (a)
32. (d)
33. (b)
34. (a)
35. (c)\
36. (a)\
37. (b)\
38. (a)\
39. (d) \
40. (a)
41. (a)
42. (c)
43. (c)
44. (c)
45. (a)
46. 21.80 to 21.95
47. (c)
48. (iv)
49. (a)
50. (d)
51. (b)
52. (c)
53. (a)
54. (b)
55. (c)
56. (d)
57. (d)
58. (d)
59. (c)
60. (c)
61. (a)
62. (b)
63. (a)
64. (b)
65. (b)
66. (a)
67. (b)
68. (d)
69. (a)
70. (d)
71. (c)
72. (b)
73. True
74. (a)
75. (c)
76. (b)
77. (c)
78. (c)
79. (b)
80. (d)
81. (c)
82. (b)
83. (d)
84. (a)
85. (a)
86. (d)
87. (a)
88. (a)
89. (c)
90. (b)
91. (a)
92. (d)
93. (c)
94. (b)
95. Mine Closure Plan
96. National Green Tribunal
97. (b)
98. 1000 kms
99. Corporate Social Responsibility
100. (a)
101. (c)
102. (c)
103. (d)
104. (c)
105. (c)
106. (a)
107. (d)
108. (b)
109. (a)
110. (c)
111. (c)
112. (a)
113. True
114. (d)
115. (a)
116. (b)
117. (d)
118. (d)
119. (c)
120. (b)
121. (a)
122. (c)

Mines and Mineral Development and Regulation (MMDR) Amendment Act, 2015

(Reproduced below a write up on this new Act)

The Mines and Mineral Development and Regulation (Amendment) Act, 2015 was passed by the Parliament during the just concluded Budget Session. This Act amends certain provisions of the Mines and Minerals Development and Regulation (MMDR) Act, 1957 and seeks to address emergent policy and regulatory issues pertaining to the mining industry. The MMDR Act, 1957, regulates the mining industry in India and specifies the requirement for obtaining and granting mining leases for mining operations. The Amendment has taken into consideration the views and recommendations of the Shah Committee and the recent Supreme Court judgment in the case of Manohar Lal Sharma versus the Principal Secretary and Ors., which cancelled all coal-block allocations since 1993, and has introduced greater transparency in the allotment of the mining leases by resorting to the auction route. Furthermore, it is an important step towards removing delays and ensuring a simpler and quicker process for granting of mineral concessions.

The mining sector is an important segment of the Indian economy and the country is endowed with huge resources of many metallic and non-metallic minerals. While mineral production is reported from 32 States/ Union Territories, almost 92% of the value of mineral production is confined to 12 states (including off-shore areas) only; Rajasthan, Odisha together contribute close to 25% of this value. However, despite having abundant mineral deposits figuring in the top 5 or 6 reserves globally across commodities such as thermal coal and iron ore, the mining industry has remained relatively small and stagnant. In fact, the Index of Mineral Production has shown a negative growth in the last 4-5 years. Moreover, the contribution of mining to India's GDP has fallen from 3.4 per cent in 1992-93 to 2 per cent in 2012-13 and the value of mineral production has remained stagnant, while the value of imports has been increasing. This is in sharp contrast to the increasing share of mining in the GDP of countries such as China, Brazil and Australia.

Also, the exploration spend in India accounts for only 0.4% of the world's exploration budget, which prevents it from keeping reserve development in line with production. India's exploration budget in 2013 stood at USD 17 per square km as against USD 51 in Brazil and USD 67 in China . Only 11 companies have planned exploration activity in India. Moreover, in the last few years, the number of new Mining Leases granted in the country has fallen substantially and renewals have also been affected by certain Supreme Court judgments. All of this has contributed to sluggish growth in the mining sector, decrease in production of important minerals, leading to import of minerals by users of those minerals. It is in this context that this brief analyzes the Amendment Act, 2015, and the potential impact on the Indian economy.

Analysis of the MMDR (Amendment) Act, 2015

The MMDR Amendment Act, 2015 seeks to introduce a more predictable and clear regulatory and policy environment for the mining sector, so as to do away with delays and improve transparency in allocation of mineral resources. Provisions of the Act are in line with the recommendations of the Anwarul Hoda Committee on National Mineral Policy. The Bill focuses on attracting private investment and leveraging the latest technology so as to enable expeditious and optimum development of mineral resources of the country. It brings clarity on licensing terms, auctions and transfer of concessions. The most significant provision of the Bill is the introduction of competitive bidding process for granting new mining leases. The salient provisions of the Amendment Bill are as follows :

Introduction of category specified as 'Notified Minerals' under the Fourth Schedule

The Amendment adds a new schedule to the MMDR Act, 1957, which includes Bauxite, Iron Ore, Limestone and Manganese Ore. The 4 minerals are defined as notified minerals and their end use is specified by the Central Government under the newly released mineral auction rules. Accordingly, bauxite, iron ore and limestone can only be reserved for the end-use of alumina, integrated steel plants and cement plants by state governments respectively whereas a manganese mine can't be reserved for any end-use. Moreover, a two-stage auction model comprising of a technical bid initially followed by a financial bid has been proposed for iron ore, bauxite, limestone and manganese ore.

Removal of discretion: auction to be sole method of allotment

The Amendment removes discretion in the grant of mineral concessions. While all mineral concessions would continue to be granted by the respective State Governments, the grant of mineral concessions would be through auctions, thereby bringing in greater transparency and removing discretion. It is also clearly specified that all mining leases would henceforth be granted for a period of fifty years as against the thirty years earlier and this would also be applicable for the mining leases granted before the commencement of the MMDRA. There will be no renewal of any mining concession and all mining leases would be put for auction at the completion of the tenure. This provision shall apply to all minerals other than coal, lignite and atomic minerals.

Provision of Composite License i.e. Prospecting Licence-cum-Mining Lease (PL-cum-ML)

Under the existing act, there were 3 kinds of licences that could be granted: Reconnaissance Permit (RP), Prospecting Licence (PL) and Mining Lease (ML). A RP is granted for preliminary prospecting through regional, aerial, geophysical or geochemical surveys and geological mapping. A PL is required for exploring, locating and proving mineral deposits. An ML is required to finally extract minerals. The Amendment creates a

new category of mining licence i.e. the prospecting licence-cum-mining lease (PL-cum-ML) referred to as the Composite Licence, which is a two stage-concession for the purpose of undertaking prospecting operations (exploring or proving mineral deposits), followed by mining operations.

It is in accordance with the new provisions that the Central Government has come out with the new mineral auction rules. Companies that were granted reconnaissance permits or prospecting licenses before the implementation of the new mining law will have the first right on prospecting and mining licenses, respectively.

Permits	Under the old law	Under the Amendment
Reconnaissance Permit	As per the discretion of the state government	Non-exclusive Reconnaissance Permits(NERP) to be given as per the discretion of state government. The NERP has to be issued within 30 days to the company upon submission of online application along with the required documents. Data found is to be submitted with government for auction.
Prospecting Licence	RP holder had the first right to PL. Decision was taken as per the discretion of the state government.	PL would be given directly to old RP holders only. New NERP holder will have to submit the data and would have to bid for composite license (PL-cum-ML)
Mining Lease	PL holder had the first right for ML. Decision was taken as per the discretion of the state government.	ML would be given directly to old PL holders only. ***Now, ML would be awarded through auction only.***

Removing pendency of applications for renewal

Impetus to the mining sector Continued operations in the mining industry have been affected due to the pendency of applications for second and subsequent renewals. In fact, this pendency has led to closure of large number of mines. The Amendment Bill, 2015 addresses this issue also and allows extension of the lease period up to 31st March 2030 for the captive mines and till 31st March, 2020 for the merchant mines or till the completion of the period of renewal already granted, if any, whichever is later. It is expected that this would immediately permit re-opening of mines that have got closed due to want of decisions on their applications for second and subsequent renewals to start their operations, subject to the necessary clearances. Provision has also been made to allow

transfer of mining leases, after securing the requisite approval from the State Governme within a timeframe of 90 days from submission of notification.

Establishment of District Mineral Foundation

Safeguarding interests of affected persons The Amendment Bill introduces a mandato provision to establish a trust, a non-profit body known as the District Mineral Foundatic (DMF) in all districts where mining related operations take place. The establishment of th DMF has been introduced to address the concerns of local people in such districts, ar work for the interest and benefit of the locals in mining affected areas.

The composition and functions of the DMF would be prescribed by the State Governmer which has to conform to the provisions of such acts as the Panchayats (Extensions t Scheduled Areas) Act, 1996, Scheduled Tribes and Other Traditional Forest Dwelle (Recognition of Forest Rights) Act, 2006 as well as provisions of the Constitution relatin to Fifth and Sixth Schedule areas while framing these rules. It also specifies the contributic to the DMF of an amount not exceeding one-third of the royalty rate in case of new minin concessions, while existing concession holders may have to pay up to 100% of th royalty.

Setting up the National Mineral Exploration Trust (NMET)

Encouraging exploration India has the same geological strata as that of Africa and Australi and thus is likely to have a similarly large geological potential. It is therefore, crucial to ge detailed exploration profiles for India. However, aeromagnetic survey has covered onl 18 per cent of the India's total area in contrast to 90 per cent of Australia's total are covered since 1990 and Australia spends 246 USD per km^2, which accounts for 13.1% of the world's total exploration budget as compared to 0.4% in case of India.

To address this, the Amendment has defined a provision to setup a ***National Minera Exploration Trust (NMET)*** with the objective of using funds contributed by the holder of a ML or a PL-cum-ML for carrying out extensive exploration exercises. The contributio shall not exceed a sum equivalent to two per cent of the royalty rate. The composition an functions of this trust would be prescribed by the Central Government.

Simplification of procedures and avoidance of delay and stringent provision against illegal mining In respect of ten minerals in Part C of First Schedule

State Governments needed to obtain the prior approval of the Central Government befor grant of mineral concessions. The Amendment removes the need for such "prior approval or approval of mining plan of the state from the Central Government, thereby making the process quicker and simpler. All offences under the Act will now be subject to a maximun punishment of 5 years imprisonment or fine of Rs. 5.00 lakhs per hectare. State Governments are also empowered to set up Special Courts for speedy trial of offences under the Act.

Chapter 13

Coal & Mineral Processing

1. **Grab sampling consists in:**
   (a) Picking pieces of ore at one place only.
   (b) Picking pieces of ore at random to make up a sample.
   (c) Picking pieces of coal only.
   (d) Picking pieces of ore in a grid fashion.

2. **The spacing of the trenches pits and boreholes depend on:**
   (a) The length of the ore body. (b) The modes of occurrence of the deposits.
   (c) The depth of the deposits. (d) The outcrops of the deposits.

3. **For determining moisture percentage, this is one of the cheapest and rapid sampling methods –**
   (a) assay sampling (b) grab sampling
   (c) table sampling (d) coning and quartering

4. **This is an old Cornish method often used to dividing samples of material and dependent on the skill of the operator and not to be used for accurate sampling**
   (a) Jones riffle (b) coning and quartering
   (c) XRF analysis (d) on - stream analysis

5. **The grade which is available from a property after actual mining is:**
   (a) Computed grade. (b) Effective grade.
   (c) Run - of - mine grade. (d) Pit head grade.

6. **When the material collected to represent a rock type, or a formation or an ore body in the quantitative sense then it is termed as:**
   (a) Specimen. (b) Sample.
   (c) Both specimen and sample can be used.
   (d) Quantitative specimen.

7. **Coning and quartering is:**
   (a) A mining method employed in unconsolidated ground.
   (b) A mining method employed for the diamond mining.
   (c) A method employed for obtaining a laboratory sample from the field sample.
   (d) A cutting and filling method employed in underground mining.

8. **The purpose of the bulk sampling of the coal is:**
   (a) To study the wash ability (b) To study the carbon content.
   (c) To study the method of formation. (d) For grading purpose.

9. **We can reduce, the energy requirement in comminution by -**
   (a) using corrugated crushing surfaces (b) chemical additives
   (c) increasing the level of bondage in particles
   (d) Nine of the above

10. **Coal & Mineral processing is carried out utilizing the physical methods.Match the method at (A) with the physical properties at (B)**

Methods (A)	Physical Properties(B)
P-Sorting	A-Difference in surface properties
Q-Gravity separation	B-Magnetic susceptibility
R-Froth flotation	C-Radioactive property
S-Magnetic separation	D-Surface properties

   Ans: (P)+(C), (Q)+(D), (R)+(A), (S)+(B)

11. **In this method the particle size of the ore is progressively reduced until the clean particles of mineral are separated -**
   (a) crushing (b) tumbling (c) comminution (d) grinding

12. **Comminution mechanism is influenced by -**
   (a) the surface area of known particles of uniform diameter is inversely proportional to the diameter
   (b) the probability of breakage in comminution in high for large particles and rapidly diminishes for fine sizes
   (c) that most of the energy input is absorbed by the machine itself and only a fraction is available for breaking the material
   (d) None of the above

13. **There are mainly two types of crushers ..... & .....**
   Ans. Jaw and Gyratory crusher

14. **Secondary crushers are of two types ..... & .....**
   Ans. Cone & Roll

15. **The mill which accepts the lowest size of feed is –**
(a) Rod mill (b) Ball mill (c) Autogenous mill **(d) None**

16. **The method of separation of two or more minerals of different specific gravity is**
(a) Floatation (b) Washing (c) Jigging (d)Heavy Media Separation(HMS)

17. **Match Law/Theory in (A) with their Area of adoption in (B)**

Law/Theory (A)	(B) Area of adoption
P-Rittinger"s	(A) Volumes of product's particle
Q-Kick's	(B) Lengths of crack formation
R-Bond's	(C) Measurements of Surface Areas

Ans . (P) + (C); (Q) + (A), (R) + (B)

18. **Mineral/Coal Processing is adopted to ..... valuable mineral content by -**
(a) recover (b) extract (c) enrich (d) all as stated

19. **From the Ore, the process of Liberation of the valuable minerals is by**
(a) concentration (b) sorting
(c) comminution (d) oxidation

20. **In this method of separation, optical and radioactive properties are used -**
(a) froth floatation (b) sorting
(c) gangue clearance (d) crushing

21. **The below mentioned method the method of gravity concentration?**
(a) forth floatation (b) jigging
(c) spiral classifier (d) duopactor

22. **Which of the following properties are utilized in forth floatation?**
(a) Specific gravity (b) viscosity
(c) differences in physico-chemical surface properties
(d) particle temperature

23. **Forth floatation technique is based on -**
(a) to create difference in temperature (b) to create difference in density
(c) to render the particles hydrophobic and facilitating bubble attachment
(d) deactivate the mineral to bubble attachment and not to control the pH of the system

24. **In this method of concentration by the degree of affinity of the minerals for rising air-bubbles within the agitated pulp. This is known as**
(a) froth flotation (b) sorting
(c) magnetic separation (d) refraction

25. **A method of separation dependent on electrical conductivity properties is called**
(a) universal separation (b) high tension separation
(c) leaching (d) gravity separation

26. **In this method of separation the difference in electrical conductance of the minerals is exploited .**
(a) Sorting (b) Gravity separation
(c) Froth flotation (d) Electrostatic separation

27. **The angle at which free flow of material takes place is called 'angle of repose'. Where it is applied –**
(a) Angle of the ore bins (b) Slope of conveyor belts
(c) Design of dumps (d) All above

28. **Reduction ratio is defined as the ratio of maximum particle size in the feed maximum particle size in the product. This is expressed by –**
R = D/d
Explain 'D' and 'd' stands for –
Ans. D=Feed size, d= Product size

29. **Rittinger's Law states that ' the ..... consumed in the size reduction is directly proportional to the ..... area produced.**
Ans.: Energy, Surface Area

30. **Kick's Law is defined as 'the energy required for comminution is proportional to reduction in volume of the new particle produced'.**
(a) log R/log f (b) log R/log p (c) log to log R/log 2 (d) None

31. **Kick's Law is applicable to crushing operation where feed material is :**
(a) above 1 cm in dia. (b) within 0.5 to 0.9
(c) < 0.5 cm in dia (d) None of the above

32. **Bond's Law is applicable in .....**
Ans : Rod mill or ball mill grinding

33. **If the Bond's Work Index for Quartz is 13.57, what is the value for Graphite?**
(a) 43.56 (b) 19.58 (c) 23.56 (d) None

34. **This expression in Kwhr per short ton, relates to the resistance of the material to crushing and grinding**
(a) reduction ratio (b) work index
(c) grindability (d) gangue liberation ability

35. **Gyratory crushers are preferred where ..... capacity is required. The crushing chamber must be kept ..... all the time.**
Ans. High, Full

36. **The main factor affecting the capacity of this crusher are La) Angle between the crushing chamber and head, (b) Feed size, (c) Speed of the spindle, (d) Stroke length and (e) Linear material.**
Name the type of Crusher
(a) Gyratory (b) Jaw (c) Roll (d) None

37. **The reduction ratio of rolls crusher is ..... for light duty rolls whereas is is about ..... for heavy duty rolls crusher.**
Ans. 1 to 2; 3 to 4.

38. **The three types of feeding arrangement are (a) Drum feeding, (b) Scoop feeding and (c) Spout feeding. To which circuit it refers.**
(a) Gyratory (b) Ball Mill (c) Jaw crusher (d) None

39. **Calculate the amount of water in the ball mill discharge which is 60% solids by weight if dry solids of 40t/h present in it.**
(a) 26.67 t/h (b) 2.667 t/ (c) 0.2667 t/h (d) 266.7 t/h

40. **Practice**
In an iron ore beneficiation plant 57% by weight concentrate is produced with 65.23 grade and tailing assayed 38.92. Calculate the feed grade and percentage recovery of iron in the concentrate of the plant.
Ans: C = Concentrate = 57% by weight
T = Tailing = 100-57 = 43%
Ff = Cc +Tt
If F – 100, f = recovery of iron
t = tailing assayed = 38.92
Therefore 100 x f = 57x65.23+43x38.92
f = 53.92
Percentage Recovery = Cc/f = 57x65.23/53.92 = 69%

41 **Mesh is defined as the 'number of openings per linear ..... on a screen surface', and that number is called mesh number.**
(a) mm (b) inch (c) cm (d) None

42. **Identify the type of screens –**
(a) Grizzly ..... type
(b) Travelling belt screens ..... type.
Ans: (a) Fixed screen (b) Moving screen

43. **The feed size specification for cyclosizer operation is..... sample weighing up to 100 gms. –**
(a) 100 to 190 mesh (b) < 100 mesh
(c) 200 to 325 mesh (d) None

44. **100 mesh means ..... openings in a linear inch.**
(a) 120 (b) 100 (c) 150 (d) 17

45. **Free settling ratio is expressed as the ratio of effective density of the heavy particle to effective density of the lighter particle in a fluid ——**
(a) Water (b) H_2SO_4 (c)HNO_3 (d) H_2SO_4+Water

46. **Two mineral particles, magnetite having specific gravity 5.2 and quartz having specific gravity 2.65 are in the mixture for classifying. Calculate the free settling ration.**
(a) 2.54 (b) 25.40 (c) 0.254 (d) 254.0

47. **Two mineral particles, magnetite having specific gravity 5.2 and quartz having specific gravity 2.65 are in the mixture for classifying in a pulp having density of 1.8. Calculate the free settling ration.**
(a) 0.40 (b) 4.0 (c) 0.04 (d) 0.004

48. **This term is defined as 'at that size where particles will get equal chance of going either as over flow or under flow' –**
(a) d50 (b) d40 (c)d60 (d)d70

49. **These are called ..... and the process is called ..... to treat coarse material as a part of gravity separation.**
(a) Jig, Jigging (b) Separator, Separation
(c) Crusher, Crushing (d) Conveyor, Conveying

50. **This is a reagent used in flotation process :**
(a) Collectors (b) pH regulators (c) Frothers (d) All these

51. **Black and Dodge are relate to which type of crusher?**
(a) Gyratory (b) Cone (c) Jaw (d) Roll

52. **Jaw crushers have -**
(a) two plates open and shut like animal jaws
(b) jaws are at an obtuse angle to each other
(c) jaws are fixed type
(d) None of the above

53. **The term 'crusher gap' relates to this type of crusher -**
(a) gyratory crusher (b) cone crusher
(c) jaw crusher (d) ball mill

54. **Selection of crusher is done on the basis of particle**
(a) shape (b) specific gravity
(c) size (d) percentage of metal in ore

55. Reduction ratio increases with
(a) smaller size of crusher (b) larger size of crusher
(c) size of ore as input (d) size is immaterial

56. **Griffith's principle is based upon**
(a) floatation (b) classification (c) separation (d) comminution

57. **Jaw crushers are classified on the basis of -**
(a) throw point (b) pitman (c) pivot point (d) input point

58. **Set of a Jaw crusher dictates on**
(a) discharge size (b) resistance time
(c) flocculation time (d) feed size

59. **The material used for the construction of Jaws of crushers -**
(a) alloy cast steel (b) ceramics
(c) plastic (d) pvc material

60. **The spindle of gyratory crusher rotates normally at the speed of**
(a) 10-15 rpm (b) 40-60 rpm (c) 85-150 rpm (d) 300-500 rpm

61. **PRACTICE : Iven below is the volumetric capacity deriving formula propounded by Taggart. The formula is expressed for which type of crusher?**
T = 0.6 LS
where, T = capacity in tonnes/hr.
L = the length of feed opening in inches
S = width of the discharge opening (set) in inches

62. **This crusher is suitable for hard, abrasive material tending to give more cubic product if the feed is laminated or slabby**
(a) ball mill (b) roll crusher (c) gyratory (d) jaw crusher

63. The maximum feed size in secondary crusher is -
(a) 5 cm (b) 15 cm (c) 30 cm (d) > 60 cm

64. **The throw of cone crusher is A times that of primary crusher? A is given**
(a) 7 **(b) 5** (c) 10 (d) 12

65. **The capital cost of roll crusher is the highest of all crushers, due to –**
(a) Rolls are driven by V-belts from separate motors
(b) a number of horizontal cylinders revolving towards each other
(c) very large rolls in relation to the size of particles
(d) None of the above

66. **In a Roll Crusher, the following equation is to determine the maximum size rock gripped in relation to roll dia. and the reduction ratio required,?**
(a) $\mu_k = [(1 + 1.12v) \div (1 + 6v)]\mu$
(b) $Q = BSs \,.\cot[a \,.k \,.60n]\, m^3/hr$
(c) $C \,\mathrm{Sin}\frac{\theta}{2} = \mu \, C \,\mathrm{Cos}\frac{\theta}{2}$
(d) $\mathrm{Cos}\frac{\theta}{2} = (R + a) \div (R + r)$

67. **If the speed of rolls is 5 RPM, roll dia. is 1000 mm, roll width 1.2m, speci gravity of feed material is 2.5 kg/m³ and distance between rolls be 0.6 m, wh will be the theoretical capacity of a roll crusher?**
(a) 1296 kg (b) 1496 kg (c) 1696 kg (d) 1796 kg

68. **This do not influence in the Grinding within a tumbling mill.**
(a) size (b) quantity (c) shape (d) type of motion

69. **This is an efficient screening system -**
(a) dry screening (b) damp screening
(c) screening of the material having moisture and clay
(d) wet screening

70. **Screen performance is dependent on -**
(a) feed material type (b) moisture in the feed
(c) presence of clay materials in the feed
(d) presence of particles closer to the aperture size

71. **Hammer mill is -**
(a) high speed crusher (b) cone crusher
(c) impact crusher (d) roll crusher

72. **Stoke's law is only derived for**
(a) setting time (b) non-spherical particles
(c) non-viscous flow region (d) spherical particles

73. **For a known particle and fluid density, fluid viscosity, if the value of terminal velocity is substituted in Stoke's equation then we get**
(a) Reynolds number (b) sedimentation diameter
(c) aperture ratio (d) decantation number

74. **Stokes law holds good for -**
(a) for the region of non-viscous flow (b) for all particles below 40 ìm
(c) for all particles above 40 ìm (d) for non-spherical particles

75. **Chose the alternative name of Sedimentation diameter -**
(a) Stokes equivalent spherical diameter (b) Andreasen pipette diameter
(c) beaker decantation (d) electrical resistance method

76. **This method has illustrated Sedimentation method -**
(a) elutriation method (b) beaker decantation
(c) Andreasen technique (d) electrical resistance method

77. **Sedimentation method is based on the principle of -**
(a) particle sizing by means of an upward current fluid
(b) change in volume of fluid
(c) measurement of the rate of settling of powder particles uniformly dispersed in a fluid
(d) None of the above

78. **How quickly and with ease the sedimentation analysis can be conducted -**
(a) simple elutriator (b) Warman cyclosizer
(c) Coulter counter (d) Andreasen pipette

79. **The elutriation process is carried out till -**
(a) the material particles are settled
(b) as long as the material powder is uniformly dispersed in the fluid
(c) until there are no visible signs of further classification or the rate of change in weights of the products is negligible
(d) until the finer particles are agglomerated in the suspended fluid

80. **Which of the following bacterium is used to enhance the rate of bacterial oxidation to liberating the occluded gold for subsequent removal by cyanide leaching?**
(a) flocculation (b) agglomeration
(c) leaching (d) none

81. **The percentage of the mineral occurring as free particles in the ore in relation to the total content is known as**
(a) degree of freedom (b) degree to bondage
(c) degree to liberation (d) degree to integration

82. **The ratio of the weight of the feed to the weight of the concentrates is called**
(a) recovery ratio (b) ratio of concentration
(c) enrichment ratio (d) smelting ratio

83. **It is the ratio of grade of the concentrate to grade of the feed and related to the efficiency of the process**
(a) enrichment ratio (b) recovery ratio
(c) stokes ratio (d) mass balancing ratio

84. **The fine product from classification is known as**
(a) slack (b) slimes (c) tramp (d) pulp

85. **Find out the average retention time of particles in the tank, where slurry is fed at 120 m^3 per hour. The volume of the floatation conditioning tank is 20 m^3?**
(a) 1 min (b) 6 min (c) 10 min (d) 24 min

86. **A pulp stream is diverted to fill up a can and the pulp density is measured to be as 1450 kg/m^3. Calculate the percentage of solids by weight? Assuming the density of solids as 2100 kg/m^3**
(a) 49% (b) 69% (c) 75% (d) 59%

87. **This model which is the combination of theoretical with empirical aspects is-**
(a) computer based model (b) steady state mathematical model
(c) comminution model (d) phenomenological model

88. **Flotation cells in the Malanjkhand Copper Mine, assays 0.75% Cu. The concentrate produced assays 30% Cu and the tailings 0.2%. Calculate the ratio of concentration?**
(a) 50 (b) 56 (c) 54 (d) 55

89. **At Hutti Gold Mines, the feed of a floatation plant assays 0.7% gold. The concentrate produced assays 30% gold and the tailings 0.15% gold. Calculate the recovery of gold to the concentrate?**
(a) 79 (b) 73 (c) 78 (d) 82

90. **For a wet mineral processing plant treating almost 10,000 ton of ore per day requires water almost**
(a) 5 m^3/min (b) 10 m^3/min (c) 15 m^3/min (d) 20 m^3/min

91. **How will you term the size of an irregular particle using a single quantity?**
(a) length (b) equivalent diameter (c) width (d) perimeter

92. **How the Stoke's diameter is measured ?**
(a) microscopically (b) sieving
(c) sedimentation and elutriation technique (d) granular

93. **How can you measure the projected area diameter?**
(a) coning & quartering (b) sieving
(c) acicular (d) microscopically

94. **Which of the following is the widely used method for particle size analysis?**
(a) sedimentation (b) grinding
(c) elutriation (d) test sieving

95. **Which of the following is the standard series of aperture of consecutive sieves and for most purposes are quite adequate?**
(a) $5\sqrt{2}$ (b) $3\sqrt{2}$ (c) $4\sqrt{2}$ (d) $\sqrt{2}$

96. **The sieve range is selected on the basis of -**
(a) no more than 15% of sample is retained on the coarsest sieve
(b) no more than 5% of sample is retained on the coarsest sieve
(c) sieve ranges can be chosen randomly
(d) such that centres at the apices of round holes should be at isosceles triangle

97. **BS (Bureau of Indian Standard) .....deals with the general procedure for test sieving -**
(a) BS 1967 (b) BS 1896 (c) BS 1796 (d) BS 2001

98. **The cumulative percentage of passing through the sieves of the material less than 125 ìm in size is**
(a) 99.9 (b) 97 (c) 87.5 (d) 36.9

99. **Results of sieve analyses performed on material ground in ball mills, are presented by this method -**
(a) Rosin-Rammler method (b) Log-Log method
(c) Power model (d) Renner and Cohen method

100. **In which of the following methods, cumulative under size data are plotted against sieve aperture?**
(a) Renner and Cohen method (b) Taggart
(c) Gates-Gaudin-Schumann (d) Fontein

101. **For particle size below 40ìm, which operation is adopted?**
(a) sub-sieving (b) regulating
(c) drew boy bathing (d) centrifuging

102. **Both sedimentation and elutriation techniques separates particles on th basis of**
(a) viscosity (b) resistance to motion
(c) fluid density (d) grinding speed

103. **In this method current changes in an electrical circuit was used fo applications of size analyzer in the range of 0.5-400 ìm -**
(a) Laser beam particle size analyzer (b) on-line particle size analyzer
(c) Coulter counter analyzer (d) Warman cyclosizer

104. **Using laser beam based particle size analysis is to measure the size of -**
(a) powdered product (b) 8 – 25 ìm
(c) 26 – 50 ìm (d) None of the above

105. **Which of the following analyzer system is not popular despite severa advantages owing to high cost -**
(a) laser beam particle size analyzer (b) on-line particle size analyzer
(c) coulter counter analyzer (d) microscopic sizing

106. **Accuracy of all size analyzing devices depend on -**
(a) simplicity of the use of the system
(b) size segregated slurry emerging from the classifying helix
(c) sensitivity of changes in sample density
(d) None of the above

107. **Mechanical classifier is a type of**
(a) hydrocyclone (b) vertical current classifier
(c) horizontal current classifier (d) multi-spigot hydrosizer

108. **What is the unit for flux density ?**
(a) Kcal/kg (b) Tesla (c) gm/cc (d) None of the above

109. **One Tesla is ..... Gauss & one Gauss is ..... Maxwell/cm²**
10,000 Gauss, 1 Maxwell/ cm²

110. **This component is not part of roll type electrostatic separator (high tension separator).**
(a) Rotor (b) Wiping electrode (c) Infrared light (d) Transformer

111. **Indian coal is difficult to wash due to presence of**
(a) high ash percentage (b) high near gravity material
(c) high moisture percentage (d) high volatile matter 106. (b)

112. ..... method determines the fixed carbon, volatile matter, moisture and ash content present in the coal. Proximate analysis

113. While analysing coal sample the following data is available –

W1 = initial weight of the sample
W2 = final weight of the sample
W3 = weight of residue after burning carbon
M = percentage moisture
L= percentage loss of weight
C = Fixed Carbon
Match the component analysed in (A) with the Result in (B)

Analysis for (A)	Results(B)
P- % Moisture	A - (L-M)
Q- Fixed Carbon	B - $\frac{W3}{W1}$ x 100
R- Volatile Matter	C- $\frac{W1-W2}{W1}$x100
S- Ash	D – $\frac{(W1-W2)-W3}{W1}$ x 100

Ans : P + C; Q + D; R + A; S+B

114. Beneficiation of Indian bituminous coal helps in –

(a) increasing heat value
(b) decreasing the quantity of rail movement
(c) reduces the ash percentage (d) All the above

115. This type of fuel is not being washed to improve heat value –

(a) Lignite (b) Bituminous coal
(c) Anthracite (d) Coking Coal

Answer Key

1. (b)
2. (a)
3. (b)
4. (b)
5. (c)
6. (c)
7. (c)
8. (d)
9. (b)
10. (P)+(C), (Q)+(D), (R)+(A), (S)+(B)
11. (c)
12. (d)
13. Jaw and Gyratory crusher
14. Cone & Roll
15. (d)
16. (d)
17. (P) +(C); (Q) +(A), (R) + (B)
18. (d)
19. (c)
20. (b)
21. (b)
22. (c)
23. (c)
24. (a)
25. (b)
26. (d)
27. (d)
28. D=Feed size, d = Product size
29. Energy, Surface Area
30. (c)
31. (a)
32. Rod mill or ball mill grinding
33. (a)
34. (b)
35. High, Full
36. (a)
37. 1 to 2; 3 to 4.
38. (b)
39. (a)
40. Practice
41. (b)
42. (a) Fixed screen (b) Moving screen
43. (c)
44. (b)
45. (a)
46. (a)
47. (b)
48. (a)
49. (a)
50. (d)
51. (c)
52. (a)
53. (c)
54. (c)
55. (a)
56. (d)
57. (c)
58. (a)
59. (a)
60. (c)
61. Practice
62. (c)
63. (b)
64. (b)
65. (c)
66. (d)
67. (c)
68. (c)
69. (d)
70. (d)
71. (c)
72. (d)
73. (b)
74. (b)
75. (a)
76. (b)
77. (c)
78. (d)
79. (c)
80. (d)
81. (c)
82. (b)
83. (a)
84. (b)
85. (c)
86. (d)
87. (d)
88. (c)
89. (a)
90. (d)
91. (b)
92. (c)
93. (d)
94. (d)
95. (d)
96. (b)
97. (c)
98. (c)
99. (a)
100. (c)
101. (a)
102. (b)
103. (c)
104. (a)
105. (a)
106. (c)
107. (c)
108. (b)
109. 10,000 Gauss, 1Max well / cm^2
110. (d)
111. (b)
112. Proximate analysis
113. P + C; Q + D; R + A; S+B
114. (d)
115. (a)

Chapter 14

Rock Mechanics & Roof Supporting

1. **A cylindrical specimen of moist clay has a diameter of 38 mm, height of 76 mm and mass of 174.2 grams. After drying in the oven at 105° C for about 24 hours, the mass is reduced to 148.4 grams. Find the dry density, bulk density and water content of the clay. Assuming the specific gravity of the sample grains as 2.71, find the degree of saturation?**
   Ans:
   Volume of the specimen = $V_t = \pi(1.9)^2(7.6) = 86.2cm^3$

   $M_t = 174.2g$

   $M_s = 148.4g$

   $\therefore P_d$ =148.4/86.2=1.722g/cm^3

   P_m =174.2/86.2=2.021g/

2. **Darcy's Law refer to the property of rock related to –**
   (a) Moisture content (b) Degree of saturation
   (c) Permeability (d) Density

3. **Hooke's Law refer to determination of –**
   (a) Modulus of Elasticity (b) Density
   (b) Compressive strength (d) None of the above

4. **Poisson Ratio refer to the –**
   (a) Rate of change of strain as a function of stress
   (b) Load applied on the material per unit area
   (c) Ratio of lateral strain to longitudinal strain
   (d) None of the above

5. **Which type of exploratory drilling helps in exploring the interior of a rock mass prior to mining?**
   (a) core drilling (b) percussive drilling
   (c) rotary drilling (d) hydraulic drilling

6. **While slake durability index, we use rock samples in the form of –**
   (a) Drill Cores (b) Uneven rock pieces
   (c) Cubes (d) None of the above

7. **Brazilian Test to determine 'tensile strength' of rock samples use core specimen having length : dia. ratio in the range of –**
   (a) 0.5 to 1.0 (b) 1.2 to 1.5 (c) 1.5 to 2.0 (d) None

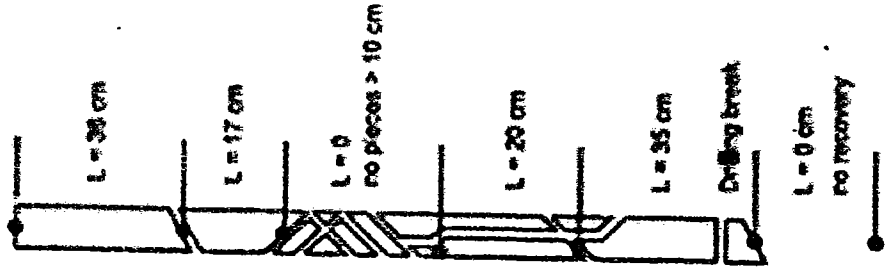
8. **Match the Rock Mass Classification in (A) with their Applications in (B)**

Rock Mass Classification in (A)	Applications in (B)
(a) Bieniawski's	(i) RQD
(b) Deere's	(ii) C-Factor
(c) Hansagi's	(iii) Q-System
(d) Barton's	(iv) RMR

9. **The following rock mass classes are defined by the RMR value:**
   Match the RMR Class No. (at A) with Classification(at B)

RMR Class No. (A)	Classification(B)
P. 100-81	1. Fair rock
Q. 80-61	2. Poor rock
R. 60-41	3. Very good rock
S. 40-21	4. Good rock
T. <20	5. Very poor rock

10. **Calculate the RQD**



(a) 55% (b) 65% (c) 75% (d) 85%

Ans: Total length of core run = 200 cms

$$RQD = \frac{\Sigma Length\ of\ core\ pieces > 10cm\ length}{Total\ length\ of\ core\ runs}$$

$$RQD = \frac{38+17+20+35}{200} \times 100 = 65\%$$

11. **Determine the porosity of a sandstone specimen, having dia. 54mm, height of 60mm, specific gravity of 2.65 and moisture content of 20% -**
(a) 0.346 (b) 1.53
(c) 1.732 (d) None

12. **Hydraulic Permeability dimension is expressed with L, M and T is –**
(a) L^2 (b) LT^{-1}
(c) LT^{-2} (d) MLT^{-1}

13. **Modulus of Elasticity dimension is expressed with L, M and T is –**
(a) $ML^{-1}T^{-2}$ (b) $ML^{-1}T^{-1}$
(c) MLT^{-1} (d) MLT^{-2}

14. **With increase in the moisture content of rock, the effect of bearing capacity of the rock –**
(a) Increase (b) Decrease
(c) Depends on the rock type (d) None of the above

15. **Weak sandstone has modulus of elasticity of 1000MPa and Poisson's ratio of 0.25 Calculate the shear strength –**
(a) 5 GPa (b) 400 GPa
(c) 500 GPa (d) 800 GPa

16. **The chemical or physical alteration of rock at its surface by its reaction with atmospheric gas and aqueous solutions. This phenomenon is known as**
(a) rook fracture (b) rock strength
(c) rock weathering (d) rock stability

17. **In this mining activity in underground, rock mechanics study helps in restricting displacements of the country rock to elastic orders of magnitude and to maintain the integrity of both the country rock and the un-mined remnants within the ore body.**
(a) driving of gallery (b) maneuvering the machines
(c) drilling of holes in faces (d) supporting the roof

18. **How many principal stresses a homogeneous, linear matrix equation developed in a stress field has?**
(a) 1 (b) 2 (c) 3 (d) 5

19. **Which of the following behavior describe quantitatively the stress-strain rates related in a material under load?**
(a) constitutive behaviour (b) homogeneous behaviour
(c) complex behaviour (d) Bieniawski's in-situ behaviour

20. **Which of the following diagram can represent one aspect of bi-axial stress action on a point with respect to a set of reference axes?**
(a) Mohr's circle diagram (b) Rose diagram
(c) Intra formational shears diagram (d) Goodman diagram

21. **The plane dividing the sedimentary rock into beds or strata is called**
(a) fracture plane (b) bedding plane
(c) plane of discontinuity (d) geo-technical plane

22. **Deere introduced this concept to quantify discontinuity spacing in rock masses**
(a) RMR (b) RQD (c) roof class (d) JRC

23. **It is an electrical resistance thermometer made from a semi-conductor having a large, negative temperature co-efficient useful to measure the rock temperature**
(a) calibrator (b) thermistor
(c) micro-seismic monitor (d) geophone

24. **It is the basic technique used in mapping surface or underground exposures to recording data for all discontinuities**
(a) scanline survey (b) geodetic survey
(c) traverse survey (d) stadia survey

25. **Name the diagram where the strikes of discontinuities are oriented at about 5° interval?**
(a) Mohr's diagram (b) Coward diagram
(c) Hock and Brown diagram (d) Rose diagram

26. **The plotting of planes and their poles is carried out with the aid of**
(a) great circle (b) lambert
(c) stereo net (d) counting net

27. **It is necessary to correct the observed pole concentrations to account for the number of discontinuities of a given set of orientation and the borehole or scanline. Who has developed this correction?**
(a) Ghose (b) Terzaghi
(c) Goodman (d) bieniawski

28. **Which of the following is not considered in Bieniawski's geo-mechanics classification?**
(a) rock strength (b) RQD
(c) ground water condition (d) layer thickness

29. **Laubscher modified Bieniawski's geo-mechanics classification by introducing which of the following criterion?**
(a) proposed for the 6th parameter or class over the Bieniawski's classification
(b) introduced relationship between unsupported underground excavation spans and the CSIR geo-mechanics classification
(c) Each classes of Bieniawski are divided into sub-classes A & B
(d) introduced some assessment on all classes other than joint condition as proposed by Bieniawski

30. **Which process of deformation indicates sudden loss of strength across a plane following little or no permanent deformation?**
(a) ductile deformation (b) effective stress
(c) brittle structure (d) residual strength

31. **What do you mean by effective stress?**
(a) It is the stress at which permanent deformation first appears
(b) It is the stress which governs the gross mechanical response of a porous material
(c) It is the stress obtained after considerable post-peak deformation
(d) It is the stress which is applied to the specimen at a constant stressrate

32. **The technique to determining the uniaxial compressive strength and deformability of rock material are given by**
(a) NIRM (b) CSIR (c) NGI (d) ISRM

33. **Which of the following is known as point load index?**
(a) (14 + 0.175 D) Is (b) P / D^2
(c) $\sigma_m = 1/3$ (d) $S = C + \sigma \tan\theta$

34. **Which of the following test may be used to provide an indirect estimate of uniaxial compressive strength?**
(a) point load test (b) servocontrolled test
(c) displacement test (d) post peak test

35. **Which attachment can monitor the axial deformation of a cylindrical specimen?**
(a) polar stereonet circle
(b) linear variable differential transformer (LVDT)
(c) brittle-ductile transition stress recorder
(d) triaxial extensometer

36. **Which criterion helps to predict development of maximum strength under various stress combinations?**
(a) residual strength criterion (b) yield strength criterion
(c) peak strength criterion (d) tensile cut-off criterion

37. **"A crack will extend only when total potential energy of the system of appli forces and material decreases or remain constant with an increase in cra length" – Whose concept is this ?**
(a) Coulomb (b) Terzaghi (c) Bieniawski (d) Griffith

38. **In the year 1977 who studied the development of rock fracture around a bore raise in a pillar in a mineralized shale at Mount Isa mine of Australia and four that the elastic around the raise of the pillar was approximately half of th mean value of 170 MPa measured in a laboratory tests. Name the Scientist**
(a) Griffith (b) Brown (c) Brady (d) Bieniawski

39. **He proposed that the shear strength parameter is not constant but i continuously variable with (â), an angle of the major principal stress directio Name the scientist ?**
(a) Brown (b) Jaeger (c) Brady (d) Serafim

40. **This is 'cell' is used to investigate the shear behaviour of discontinuities Name the cell ?**
(a) load cell (b) triaxial cell (c) lead cell (d) extensomete

41. **Which of the following is the value of normal stiffness, K_n in respect of norma stress-normal displacement linear behaviour of discontinuities?**
(a) 1 (b) 2 (c) 3 (d) constant

42. **Which of the following stiffness/deformation is calculated when slope to th shear stress – shear displacement curve is highly variable and exceeding difficult to predict?**
(a) shear stiffness (b) joint roughness co-efficient (JRC
(c) modulus of deformation (d) normal stiffness

43. **Stress analysis by Computational methods adopts two distinct categories one method is 'integral', Name the other method ?**
(a) differential method (b) boundary element method
(c) finite element method (d) hybrid schemes

44. **When the combined dynamic and static stresses exceed the strength of t rock mass, there is a tendency**
(a) to slip
(b) to increase the zone of induced stress
(c) to create a source for such stress waves which do not propagate through r medium
(d) to correlate the dynamic stresses with released energy magnitude

45. **Crown hole is a type of**
(a) continuous or trough subsidence (b) discontinuous subsidence
(c) plug subsidence (d) funneling

46. **Chimney caving involves the progressive migration of an unsupported mining activity and the sudden mode of formation rather than progressive one is known as**
(a) sink holes (b) block caving subsidence
(c) progressive hanging wall caving (d) plug subsidence

47. **Mining in thin, flat-dipping, tabular ore bodies by long wall technique give rise to**
(a) discontinuous subsidence (b) plug subsidence
(c) chimney subsidence (d) continuous subsidence

48. **The first indication of subsidence is .....?**
(a) widening of patches (b) fire in underground district
(c) small cracks on surface (d) pressure building on underground support

49. **What is a safe cover i.e. the tolerance limit for extraction of coal pillars with caving where railway line or important structure is on the surface? Assuming, 'T' is the seam thickness in meter.**
(a) 9 x T (b) 18 x T (c) 27 x T (d) 54 x T

50. **Subsidence is not influenced by ?**
(a) agricultural land (b) water table
(c) loss of coal (d) volume of firedamp

51. **Calculate the average stress on pillars adopting the Tributary area approach. Assuming your own conditions and using the formula**

$$\sigma_n = \gamma^H (cos^2\alpha + sin^2\alpha)$$

and the average stress on the pillar, P or σ_P:

$$P = \sigma_P = \frac{\sigma_n}{1-R} = \sigma_n[(B+w)/w]^2$$

Where,

H = depth of cover, m
B = width of the mined out area, m
γ = unit rock pressure = 0.025 Mpa/m or depth
R = extraction ratio
w = width of the pillar, m
α = dip of the seam

The value of k, which is the ratio of horizontal to vertical in-situ stress, is taken as 1 in the absence of actual stress measurements.

52. **A sub-critical subsidence profile is shown in the figure below. The points A, B, C, and D represent respectively the points of**
(a) zero vertical displacement, maximum tension, inflexion, maximum compression
(b) inflexion, maximum tension, maximum compression, zero vertical displacement
(c) maximum tension, inflexion, maximum compression, zero vertical displacement
(d) maximum compression, maximum tension, inflexion, zero vertical displacement

53. **This does not contribute for the cause of the subsidence ?**
(a) stowing is not done (b) depth of cover is more
(c) friable nature of superincumbent rock (d) void is not supported effectively

54. **'Angle of draw' in subsidence is defined as**
(a) angle between vertical and point of zero subsidence
(b) angle between horizontal and point of zero subsidence
(c) angle between vertical and final line of break
(d) angle between vertical and centre of underground gallery

55. **According to CMR 1957, formulation of which of the following rules is mandatory?**
(a) SSR (b) RMR (c) RQD (d) RQI

56. **The full form of 'SSR' is**
(a) safari support of roof (b) steel support recovery
(c) solid support rating (d) systematic support rule

57. **The full form of 'RMR' is**
(a) roof mass recovery (b) roof measurement rules
(c) rock mass rating (d) round mass recovery

58. **Chances of 'Span failure' is maximum for**
(a) wider gallery (b) narrow gallery
(c) staggered gallery (d) blasting gallery

59. **Which of the following regulation of CMR 1957 provides stipulation on SSR?**
(a) 102 (b) 104 (c) 106 (d) 108

60. **During setting of supports in underground, a lid is used over the prop. The length of such lid shall not be less than**
(a) 10 cm (b) 20 cm (c) 40 cm (d) 50 cm

61. **As per the statute where a prop is set on loose material, a flat base piece is to be used which should be 'A' cm in length. A is given by**
(a) 5 cm (b) 25 cm (c) 50 cm (d) 75 cm

62. **RMR of any rock type considers the 5 (five) parameters, name the parameter which is not considered?**
(a) layer thickness (b) structural features
(c) face advancement (d) ground water seepage

63. **Rock type having RMR value 70, to which roof class it belongs ?**
(a) poor (b) fair (c) good (d) very good

64. **This factor is not considered in pressure arch theory –**
(a) depth of cover (b) width of gallery
(c) strata Characteristics (d) prop density

65. **This rock type when occur as immediate roof type, it is treacherous and very unreliable. Name the rock type?**
(a) sand stone (b) coal (c) shale (d) state

66. **Roof support in underground excavations/mines is**
(a) to support immediate roof (b) to prevent sagging of roof
(c) to prevent bed separation (d) all of the above

67. **When widening of gallery is done, the bending force increases. If this is not checked by providing artificial support then this will not happen?**
(a) roof sagging (b) bed separation
(c) air blast (d) reduced roof fall

68. **Staggered junction in underground will pose these problems?**
(a) problem in laying transport system (b) difficulty in setting supports
(c) problem in coursing work (d)difficulty in air quantity measurement

69. **CIMFR has given monograms indicating support resistance required for different values of cavability index for various heights of extraction.**

Capacity of Powered Support = $\frac{R \times S \times S_2 \times K_1 \times K_2}{n}$

Where R =Effective support resistance = 80(from Nomogram)
S = Span at Longwall face = 4
S_2 = Spacing between members of support system=1.2
K_1 = Factor to take care of span variation (1.2)
K_2 = Factor to compensate for leakage and low setting load (1.1)
n = Efficiency (0.8 to 0.9) = 0.8

Calculate the Capacity of Powered Support.
(a) 500 tonne (b) 600 tonne (c) 620 tonne (d) 480 tonne

70. **Match the Seismic Velocities in (A) with their definitions in (B)**

Seismic Velocities in (A)	Definitions in (B)
(a) P-waves	(i) Surface waves that travel as ripples
(b) Rayleigh waves	(ii) Transverse or shear waves
(c) S-waves	(iii) Longitudinal or compressional waves
(d) Love waves	(iv) Surface waves that cause horizontal shearin

71. **The first generation of powered support is-**
(a)Chock shield (b) Shield (c) Frame (d) Chock

72. **Power pack is provided at Long Wall face to give pressure to-**
(a) Powered support (b) Armoured Flexible Conveyor(AFC
(c) Double Ended Ranging Drum Shearer (DERDS)
(d) Stage Loader

73. **This factor influences in the calculation of support resistance in Indian Lon Wall mines –**
(a) Convergence of the strata above the coal seam
(b) Length of the Long Wall face
(c) Length of the Panel (d) Height of the immediate roof

74. **The terms setting pressure and yielding pressure relate to**
(a) Powered support
(b) Armoured Flexible Conveyor(AFC)
(c) Double Ended Ranging Drum Shearer (DERDS)
(d) Stage Loader

75. **At both the Gate Roads, advance support of 30 m. Is required due to –**
(a) Front abutment pressure (b) Back abutment pressure
(c) Both front and back abutment pressure (d) Yield Pressure

76. **We use load cell and Convergence Recorders for –**
(a) Powered support (b) Both gate roads
(c) Along the Shearer (d) At Armoured Face Conveyor

77. **Low setting pressure is meant for –**
(a) Line of breaking at the rear part of the Canopy
(b) More safe for better productivity
(c) Cavity occur in between the Canopy tips and the Face
(d) Cavity of strata become regular

78. **In the hydraulic system, ring main is for –**
(a) To get uniform pressure on the powered support
(b) To get better shearer performance
(c) To ensure better coal evacuation (removal from face)
(d) None of the above

79. **In any underground coal mine this occurs first –**
(a) Main fall (b) Periodic fall (c) Local fall (d) Air blast

80. **In the power pack the setting of the un-loader valve is operated by**
(a) Section Engineer (b) Mines foreman
(c) Colliery engineer (d) Manufacturer

81. **In which system of a Long Wall face the positive set valve (PSV) helps in operator error –**
(a) Powered support (b) Armoured Flexible Conveyor(AFC)
(c) Double Ended Ranging Drum Shearer (DERDS)
(d) Stage Loader

82. **Name the system where SIVAD unit is used to operate Long Wall face -**
(a) Powered support
(b) Armoured Flexible Conveyor(AFC) and stage loader
(c) Double Ended Ranging Drum Shearer (DERDS)
(d) None of the above

83. **In this roof type no warning prior to its break is received. Name the type of roof?**
(a) laminated roof (b) massive roof
(c) shaley roof (d) coal as immediate roof

84. **This is a Quick setting support ?**
(a) roof bolt (b) pit prop (c) square chock (d) steel arch

85. **Holes are drilled on the coal pillars so as to install one safari support in Bord & Pillar working. How many holes are to be drilled at the coal pillar side?**
(a) 1 (b) 2 (c) 3 (d) 4

86. **SSR do not generally specifies about**
(a) quantity of supports (b) quality of supports
(c) type of supports (d) skill of timber crew

87. **This authority approves the SSR of any underground mine -**
(a) Colliery Manager (b) Safety Officer
(c) Director (Technical) (d) Director of Mines Safety

88. **This do not influence in the choice of support-**
(a) working height (b) nature of roof
(c) coal strength (d) blast vibration

89. **Prop density is defined as**
(a) weight carried by a single prop (b) time elapsed to set a prop
(c) number of props required to support one sq meter area
(d) number of person required to erect a prop

90. **Advantage of steel support over timber support is -**
(a) easy to install (b) recovery and re-use
(c) prior indication of roof weighting (d) cheap in cost

91. **Term used for Fall of weak immediate roof in underground in layers -**
(a) flaking (b) beam failure
(c) guttering (d) arch failure

92. **Square chock is mostly preferred to erecting at -**
(a) at face (b) at drive head of conveyors
(c) at junction (d) at tunnel

93. **Powered support is used in**
(a) bord and pillar mining (b) longwall mining
(c) opencast mining (d) room and pillar mining

94. **Underset prop is a**
(a) tapered prop (b) pit prop
(c) prop whose axis remains in between vertical and normal to the seam
(d) prop whose axis is normal to the dip of the seam

95. **Steel arches is normally recommended to use as permanent support at**
(a) face (b) gallery junction
(c) main travelling (d) main dip section

96. **What is the expected range of LBC of a 2.5 m long. 15 cm diameter timber prop?**
(a) 5-10 KN (b) 15-20 KN
(c) 50-60 KN (d) 120-130 KN

97. **In case of wooden prop, if length to diameter ratio is higher then it is obvious that**
(a) LBC in higher (b) LBC is lower
(c) LBC remains (d) Props becomes very costly

98. **Which of the following bolting practice do not require any quick setting cement capsule in the drill hole?**
(a) recoverable type of bolt (b) non-recoverable type hole
(c) bamboo bolt (d) side stitching

99. Below mentioned are some features or cases of roof bolting. Identify one of such case where roof bolting may be ineffective?
(a) requirement of such support which is fire-proof in nature
(b) handling and transporting
(c) about clearance in the roadway
(d) application in highly watery face

100. At free front face, the roof support is provided by
(a) hydraulic chocks
(b) cantilever bar
(c) triangular chocks
(d) steel prop

101. Dry and wet rot terminology are used to denote
(a) power of timber
(b) quality of timber
(c) diseases of timber
(d) specification of timber

102. Chockmate is used in metal mines. Which of the following coal mine support is similar to chockmate?
(a) triangular chock
(b) square tool set chock
(c) wooden cog
(d) cross bar

103. Hydraulic oil of a hydraulic prop is a combination of
(a) 50% oil emulsion and 50% water
(b) 25% oil emulsion and 75% water
(c) 1% oil emulsion and 99% water
(d) 5% oil emulsion and 95% water

104. The uniaxial compressive strength of a limestone sample is 80 MPa. The sample is confined at a pressure of 20 MPa in a triaxial compressive strength test. Based on Hoek-Brown failure criteria the maximum principal stress at failure in MPa is
(consider rock constants as m = 7.88, s = 1.0 and a = 0.5)
(a) 117.9 (b) 132.3 (c) 137.9 (d) 157.9

105. Maximum accidents in India is caused due to
(a) roof fall (b) inundation (c) gas explosion (d) fire

106. Roof fall accidents are caused due to
(a) no support given at the face
(b) insufficient support and delay in erection of support
(c) maximum concentration of workers is there at the face
(d) blasting and misfired shots

107. Roof fall accidents can be minimized by
(a) formulation of SSR and proper implementation of the support rule
(b) minimizing the entry of manpower in the mine
(c) by proper supply of support items
(d) none of the above

108. What is the main reason to support a slip or fault plane on its both sides?
(a) it is a weak zone of the mine
(b) a slip or fault plane is the line of fracture of strata & very difficult to hold it
(c) it indicates the weaker section of the district
(d) none of them

109. Maximum support are required within 10 m of freshly-exposed roof-why?
(a) maximum person are there in he face
(b) that portion generally remain unsupported due to violence of blasting & incumbent strata pressure is shifted towards pillar edge
(c) this is the only place of working in the district in a mine
(d) it is easy to install supports at the face

110. Shale as immediate roof in underground coal mine is not suitable because
(a) It is difficult to support
(b) It gives less waning prior to fall
(c) It has high affinity to moisture & departs from roof easily
(d) It gives bet sound while testing

111. It is difficult to control shaley roof if coal is not left with the shale-why?
(a) it is weak in nature
(b) it has weathering effect
(c) it has great affinity to absorb moisture and get departed from immediate roof
(d) it reacts with coaly surface

112. When the Young's Modulus is small, failure of immediate roof will initiate from?
(a) at the gob edges near the chain pillar
(b) at the centre of chain pillar
(c) at the centre of the gob
(d) just above the corner powered support of the set of powered support

A-1 In a uniaxial compressive test, the following details were obtained

Name	Diameter (cm)	Length (cm)	Weight(N)	Load (N)	Area (cm^2)	Strength (MPa)
Coarse grained sandstone	5.114	11.113	53.5	26000	20.55	12.65
Fine grained sandstone	5.432	11.36	64.5	8000	23.18	29.34

113. Calculate the density (kN/m^3) of the samples.

114. Calculate the uniaxial compressive strength of the samples.

$$\frac{53.5}{[\pi(5.114)^2/4]x1.113}x10^2$$

Ans: Density of the sample =
Unit weight of coarse grained sandstone = 23.4 kN/m3
Unit weight of fine grained sandstone = 24.5 kN/m3
Uniaxial compressive strength of coarse grained sandstone = 12.65 MPa
Compressive strength of fine grained sandstone = 29.34 MPa

115. What is the ratio $\frac{V_P^2}{V_S^2}$ in terms of the elastic rock constants? Find the value of the ratio for $\mu = 0.27$

Ans. We know that

$$V_p = \sqrt{E(1-\mu)1p(1-2\mu)(1+\mu)}$$

And $V_s = \sqrt{\frac{E}{2p(1+\mu)}}$

Therefore $\frac{V_P^2}{V_S^2} = \frac{2(1-\mu)}{(1-2\mu)}$

$$= \frac{2(1-0.27)}{(1-0.54)}$$

$$= 3.174$$

Thus the longitudinal waves propagate faster than the transverse waves

116. A rock mass has the following characteristics: the compressive strength of the intact rock is 80 MPa, the RMR (Rock Mass Rating) is 62%, and the GSI (Geological Strength Index) is 50. Estimate the in situ deformation modulus, E_m?

$$E_m = 2RMR - 100$$

$$= 2x62 - 100 = 24GPa$$

$$E_m = 10^{\frac{RMR-10}{40}} = 10^{\frac{62-10}{40}} = 10^{\frac{52}{40}} = 20GPa$$

$$E_m = \sqrt{\frac{\sigma ci}{100}}.10^{\frac{RMR-10}{40}}$$

$$E_m = \sqrt{\frac{80}{100}}.10^{\frac{50-10}{40}} = 9GPa$$

117. The following table shows data obtained from a single stage triaxial compression test on a cylindrical rock sample, at a confining stress of 10 MPa, and at zero pore pressure.

Total axial load (kN)	Sample height (mm)	Sample diameter (mm)
0.00	100.84	50.20
19.89	100.80	50.20
39.60	100.77	50.20
63.40	100.74	50.20
88.67	100.71	50.21
116.18	100.68	50.21
144.68	100.65	50.22
162.38	100.63	50.22
185.23	100.58	50.24
190.62	100.56	50.25
191.99	100.54	50.25
180.22	100.52	50.26
137.56	100.49	50.26
115.79	11046	50.27
101.93	100.43	50.28
97.97	100.40	50.28
96.98	100.37	50.28

Estimate values for the following:

i. Yield strength
ii. Peak strength
iii. Residual strength
iv. Tangent Young's modulus, E_{tan} at 50% peak axial stress
v. Tangent Poisson's ratio at 50% peak axial stress

The stress and strain values are given in the table below. Note that the axial strain values are positive, but the diametral strain values are negative.

Axial stress (MPa)	Axial strain	Diametral strain
0	0	0
10.05	0.397	-0.020
20.01	0.694	-0.060

Axial stress (MPa) Axial strain Diametral strain 0 0 0 10.05 0.397 -0.020 20.01 0.694 -0.060 32.03 0.992 -0.100 44.79 1.289 -0.159 58.67 1.587 -0.239 73.05 1.884 -0.319 81.97 2.083 -0.438 93.45 2.578 -0.717 96.13 2.777 -0.916 96.80 2.975 -1.056 90.85 3.173 -1.155 69.32 3.471 -1.295 58.34 3.768 -1.414 51.34 4.066 -1.534 49.34 4.363 -1.653 48.84 4.661 -1.6553

The curves associated with these results are shown below.

The strength parameters are as follows:

(i)yield strength 83 this is where the axial stress-axial strain curve becomes visibly non-linear.

(ii) Peak strength 97 this is the maximum axial stress the specimen sustained.

(iii) Residual strength 49 this is the final stress value given, which may have reduced further had the test been continued.

(iv) Tangent Young's modulus 50% is computed from the axial stress and axial strain values immediately above and below 50% of the peak axial stress. The values is given by 58.70"44.80 1.171"0.893 = 13.9 0.278 = 50.00 GPa Peak Stress Yield Point Residual stress In practice, we would compute this value from several ranges of values to estimate any variation.

(v) Tangent Poisson's ration at 50% peak stress is computed from the axial stress and axial strain values immediately above and below 50% of the peak axial stress. The values is given by 0.159"0.100 1.171"0.893 = 0.059 0.278 = 0.21Bottom of Form

118. A granite rock mass containing 3 joint sets, average RQD is 88%, average joint spacing is 0.24 m, joint surfaces are generally stepped and rough, tightly closed and unweathered with occasional stains observed, the excavation surface is wet but not dripping, average rock material uniaxial compressive strength is 160 MPa, the tunnel is excavated to 150 m below the ground where no abnormal hith in situ stress is expected.
Selection of RMR parameters and calculation of RMR is shown below –

Rock material strength	**160MPa**	**Rating**	**12**
RQD(%)	88%	Rating	17
Joint Spacing(m)	0.24m	Rating	10
	Very rough, unweathered, no separation	Rating	30
Groundwater	wet	Rating	07
Total Rating, Rock of 'B'Class, Good Quality.			76

SAMPLE :

A sandstone rock mass, fractured by 2 joint sets plus random fractures, average RQD is 70%, average joint spacing is 0.11m, joint surfaces are slightly rough, highly weathered with stains and weathered surface gut no clay found on surface, joints are generally in contact with apertures generally less than 1 mm, average rock material uniaxial compressive strength is 85 MPa, the tunnel is to be excavated at

80m below ground level and the groundwater table is 10m below the ground surface.

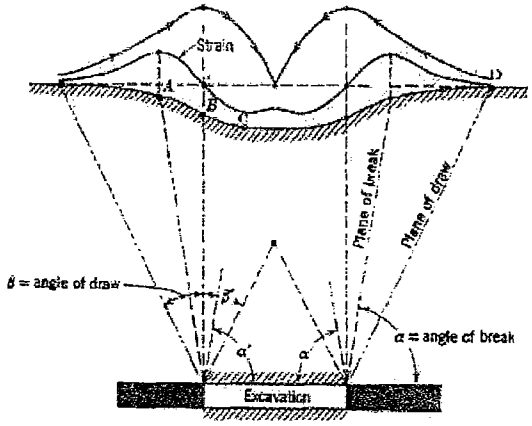
Here, groundwater parameter is not directly given, but given in terms of groundwater pressure of 70m water head and overburden pressure of 80m ground. Since there is no indication of in situ stress ratio, overburden stress is taken as the major in situ stress as an approximation.

Joint water pressure = Groundwater pressure = 70m x γw
In situ stress = Overburden pressure = 80m x γ
Joint water pressure/In situ stress = 0.32
Selection of RMR parameters and calculation of RMA are shown below :

Rock material strength	85 MPa	Rating	7
RQD (%)	70%	Rating	13
Joint spacing (m)	0.11 m	Rating	8
Condition of joints	slightly rough, highly weathered, separation < 1mm	Rating	20
Groundwater	water pressure/stress = 0.32	Rating	4
		RMR	52

Ans : The calculated basic RMR is 52. It falls rock class C which indicates the rock mas is or fair quality.

119. A sub-critical subsidence profile is shown in the figure below. The points A, B, C, and D represent respectively the points of



(a) zero vertical displacement, maximum tension, inflexion, maximum compression
(b) inflexion, maximum tension, maximum compression, zero vertical displacement
(c) maximum tension, inflexion, maximum compression, zero vertical displacement
(d) maximum compression, maximum tension, inflexion, zero vertical displacement

120. Out of the support categories given for an underground coal mine, identify the 'active support'
(a) wire mesh
(b) shotcrete
(c) fully grouted roof bolt
(d) hydraulic prop

121. Massive sandstone in immediate roof delays the local fall in goaf of a coal mine. Under this condition, crushing of the pillars at outbye side is called
(a) coal bump
(b) overriding of pillars
(c) stiffening of pillars
(d) spalling of pillars

122. Match the following locations with support types in coal mines.

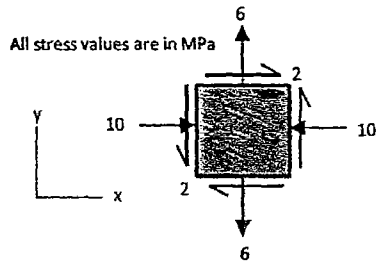
Location	Support type
P. Roadway junctions	1. Powered support
Q. Between adjacent panels	2. Chock and bolt
R. Longwall face	3. Back fill
S. Goaf	4. Barrier pillar

(a) P-3,Q-3,R-1,S-4
(b) P-4,Q-3,R-1,S-2
(c) P-2,Q-4,R-1,S-3
(d) P-2,Q-3,R-4,S-1

123. Subsidence profile function, s(x), along the lateral cross-section over a flat longwall panel is given as
$s(x) = 0.8\left[0.996 - tanh\left(\frac{8.3x}{D}\right)\right], m$
where x = distance (m) from the inflection point and D = depth (m) of the seam. Considering that the inflection point lies vertically above the edge of the panel, the angle of draw in degrees for a depth of 250 m is _____

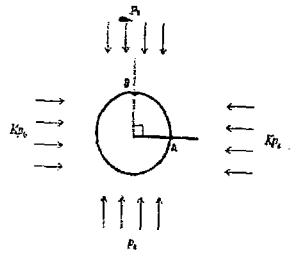
124. A goaf voidof 250 m^3 is filled in 3 hours by hydraulic sand stowing method. Density of the sand is 2.6 tonne/m^3. If the filling factor of goaf void is 0.9 and sand to water ratio in the stowing mixture is 1.0 tonne to 1.1 m^3, the stowing rate in m^3/h is _____

125. Biaxial stresses at a point inside a pillar are shown in the figure.



The magnitude of the maximum shear stress in MPa and its direction with the x-axis in degrees at the same point respectively are
(a) 8.25, 37.98
(b) 7.49, 37.98
(c) 8.25, 52.02
(d) 7.49, 52.02

126. A circular tunnel is constructed in a biaxial far field stress (vertical stress P_o and horizontal stress K_{P_0} as shown in the figure.



If the ratio of the tangential stress measured at the boundary points A and B is 3:1, the value of K is _____

127. Copper ore of average grade 0.65% is mined, milled, smelted and then refined. The following information is available :

Mill recovery rate	: 85%
Average grade in mill concentrate	: 20%
Loss in smelting process	: 5 kg/tone of concentrate
Loss in refining process	: 2 kg/tone of blister copper

The amount of refined copper obtained per tonne of ore in kg is
(a) 5.10
(b) 5.37
(c) 5.52
(d) 6.50

128. The ratio of horizontal to vertical in-situ stresses, K, at a mine field varies with depth, D(in m) as
$$K = \frac{267}{D} + 1.25$$
If the unit weight of overburden rock is 25 kN/m3, the horizontal stress in MPa at a depth of 400 m is _____

129. In an underground coal mine, a freshly exposed roof can be supported by a temporary support in the form of
(a) triangular chocks
(b) screw props
(c) safari supports
(d) hydraulic props

130. In Mohr-Coulomb failure criterion, the ratio of the uniaxial compressive strength to the tensile strength is
(a) $\frac{1+sin\emptyset}{1-sin\emptyset}$
(b) $\frac{1-sin\emptyset}{1+sin\emptyset}$
(c) $\frac{C(1+sin\emptyset)}{C(1-sin\emptyset)}$
(d) $\frac{2C(1+sin\emptyset}{(1-sin\emptyset)}$

131. The average Young's modulus and Poisson's ratio values of a limestone sample are 60x10^3 MPa and 0.3 respectively. The shear modulus in MPa is
(a) 23.07
(b) 230.7
(c) 2307.0
(d) 23070.0

132. The angle of draw in a trough subsidence helps in determining the
(a) maximum subsidence (b) extent of surface subsidence
(c) plane of fracture (d) critical width of the opening

133. In the Moh's scale of hardness, the minerals in increasing sequence of hardness are
(a) calcite, gypsum, topaz, diamond (b) topaz, gypsum, calcite, diamond
(c) calcite, gypsum, diamond, topaz (d) gypsum, calcite, topaz, diamond

134. A cylindrical rock specimen of diameter 54 mm has Young's modulus of 68.97 GPa and Poisson's ratio of 0.35. The rock specimen fails in uniaxial compression at a lateral strain of 0.01%. The axial load at failure in kN is _____

135. A core sample of a rock, having diameter 54 mm and length 108 mm, is subjected to axial loading. If the axial strain and Poisson's ratio are 2000 ' 10^{-6} and 0.28 respectively, the value of volumetric strain , represented in micro-strain is _____

136. In an experiment to determine specific gravity of a soil sample, the following data is obtained:

Mass of empty pycnometer	20.4 g
Mass of pycnometer with soil sample	51.6 g
Mass of pycnometer with soil sample filled with water	88.6 g
Mass of pycnometer filled with water	70.4 g

The specific gravity of the sample is _____

137. Stress concentration at a point on the wall of a vertical shaft results in a compressive stress of 59.66 MPa. The wall rock mass has an unconfined compressive strength of 89.49 MPa. The safety factor of the shaft wall at the point is
(a) 0.67 (b) 0.86 (c) 1.23 (d) 1.50

138. A core sample of 54 mm diameter having Young's modulus of 68.97 GPa fails in uniaxial compression at 0.1% axial strain. The axial load at failure in kN is
(a) 158.00 (b) 68.97 (c) 58.00 (d) 15.80

139. A typical case of gravity loading under complete lateral restraint in flat strata is shown in the figure below. The physico-mechanical parameters of the strata are given in the table. The *in situ* stresses($\sigma_Z \sigma_H$) on the top of the coal seam in MPa are

Strata	Thickness(m)	Specific Gravity	Young's Modulus (GPa)	Shear Modulus (GPa)
Sandstone	50	2.35	26.40	12.5
Shale	25	2.15	20.50	8.25
Coal	20	1.52	2.41	0.95

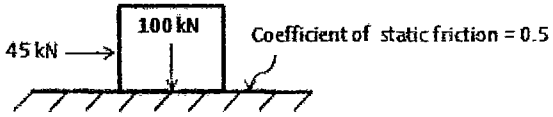
(a) (10.17, 2.54) (b) (10.17, 3.69) (c) (11.68, 3.69) (d) (11.68, 2.54)

140. Given *k* is the thermal conductivity, *p* is density and *c* is specific heat of a rock sample, the thermal
(a) $\frac{kp}{c}$ (b) $\frac{pc}{k}$ (c) $\frac{kc}{p}$ (d) $\frac{k}{pc}$

141. A piece of coal sample weight 10 kg in air and 2 kg when immersed in water. The specific gravity of the coal sample is _____

142. In a borehole log of 1.2 m in length, recovery of rock cores in cm is given below
20, 8, 15, 8, 8, 4, 3, 9, 10, 1, 5, 10
The RQD in percentage is
(a) 29.2 (b) 31.8 (c) 45.8 (d) 50.0

143. A block of weight 100 kN rests on a floor as shown in the figure, The coefficient of static friction between the block and the floor is 0.5. A force of 45kN is applied horizontally on the block. The static frictional force in kN is



(a) 22.5 (b) 50.0 (c) 55.5 (d) 100.0

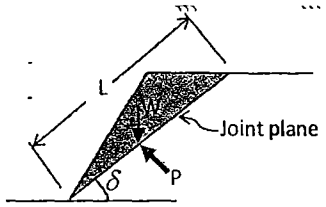
144. A spring of constant stiffness *k* is stretched from point A to point B (displacement *u* in the figure by a force F. The potential energy of the spring is expressed by
(a) $\frac{1}{2}ku^2 - Fu$ (b) $\frac{1}{2}ku^2 + Fu$ (c) $ku - F$ (d) $ku + F$

145. If σ_s is the induced stress and σ_i is the insitu stress at a point below ground, the 'stress concentration' at that point is
(a) $\sqrt{\frac{\sigma_s}{\sigma_i}}$ (b) $\sqrt{\frac{\sigma_i}{\sigma_s}}$ (c) $\frac{\sigma_i}{\sigma_s}$ (d) $\frac{\sigma_s}{\sigma_i}$

146. The components of state of stress at a point in *x-y* plane are given as $\sigma_{xx} = 5MPa, \sigma_{yy} = 10MPa$ and $\tau_{xy} = -2MPa$. The sum of the principal stress acting on the *x-y* plane in MPa is _____

147. A dry sample of diameter 50 mm and length 100 mm weight 300 g. After saturating in brine solution of specific gravity 1.05, its weight increased to 330g. The porosity of the rock sample in percentage is _____

148. A joint of length L and dip ä intersects the toe of a slope as shown in the figure. The weight of the shaded block is W. Uniform water pressure P acts normal to the joint plane. If the cohesion and angle of internal friction of the joint surface are *c* and □ respectively, then the expression for 'safety factor' of the shaded block is



$\frac{Lc+(W\cos\delta-LP)\tan\phi}{W\sin\delta}$

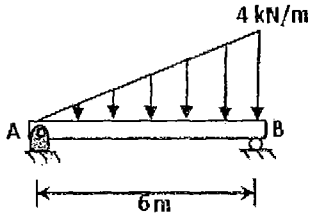
$\frac{Lc+(W\sin\delta+LP)\tan\phi}{W\cos\delta}$

$\frac{Lc+(W\sin\delta-LP)\tan\phi}{W\cos\delta}$

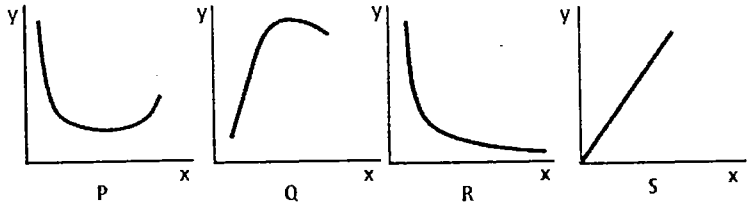
(B) $\frac{Lc+(W\cos\delta+LP)\tan\phi}{W\sin\delta}$

(a) 52.1, 16.1 (b) 221.2, 23.2 (c) 102.3, 53.4 (d) 180.3, 73.9

149. A distributed load of 4 kN/m acts on a beam of 6 m length supported by a hinge and a roller as shown in the figure. The distance in m of the point of zero shear in the beam from the point A is _____



150. The following characteristic curves (P, Q, R, S) pertain to rotary drilling in rock. Title of the curve



I. Torque versus RPM
II. Rate of penetration versus uniaxial compressive strength of rock
III. Rate of penetration versus weight on bit
IV. Specific energy versus weight on bit

Match the curves with their titles

(a) P-III, Q-IV, R-II, S-I (b) P-II, Q-IV, R-I, S-III
(c) P-IV, Q-III, R-II, S-I (d) P-I, Q-III, R-II, S-IV

151. Which one of the following is the most likely mode of slope failure for waste dump

(a) Circular (b) Wedge (c) Plane (d) Toppling

152. Given S is the setting load and Y is the yield load of a hydraulic prop, The correct relationship is

(a) S<Y (b) S>Y (c) S=Y (d) $S=Y^2$

153. A core sample of a rock, having diameter 54 mm and length 108 mm, is subjected to axial loading. If the axial strain and Poisson's ratio are $2000 * 10^{-6}$ and 0.28 respectively, the value of volumetric strain, represented in micro-strain is _____

(a) 0.000835 to 0.000845 (b) 0.000855 to 0.000865
(c) 0.000865 to 0.000875 (d) 0.000875 to 0.000885

154. A rock specimen has moisture content of 2.5%, volume of solids 75% and specific gravity of the solid 2.5. Calculate the degree of saturation(S) using the formula –

S = Volume of Water (V_w)/ Volume of Void(V_v)

(a) 1.975 % (b) 19.75% (b) 0.1975% (d) 30%

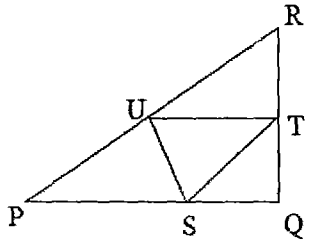
Answer Key

1. Practice
2. (c)
3. (a)
4. (c)
5. (a)
6. (b)
7. (a)
8. (a+ (iv), (b) + (i), (c) + (ii), (d) + (iii)
9. P + 3 , Q + 4 , R + 1 , S + 2 , T+5
10. (b) Practice
11. (d)
12. (b)
13. (a)
14. (b)
15. (d)
16. (c)
17. (d)
18. (c)
19. (a)
20. (a)
21. (b)
22. (b)
23. (b)
24. (a)
25. (d)
26. (c)
27. (b)
28. (d)
29. (c)
30. (c)
31. (b)
32. (d)
33. (b)
34. (a)
35. (b)
36. (c)
37. (d)
38. (c)
39. (b)
40. (b)
41. (d)
42. (a)
43. (a)
44. (a)
45. (b)
46. (d)
47. (d)
48. (b)
49. (d)
50. (d)
51. Practice
52. (c)
53. (b)
54. (c)
55. (a)
56. (d)
57. (c)
58. (a)
59. (d)
60. (d)
61. (d)
62. (c)
63. (c)
64. (d)
65. (c)
66. (d)
67. (d)
68. (a)
69. (b)
70. (a) + (iii), (b) + (i), (c) + (ii), (d) + (iv)
71. (c)
72. (a)
73. (a)
74. (a)
75. (a)
76. (b)
77. (c)
78. (a)
79. (c)
80. (d)
81. (b)
82. (b)
83. (b)
84. (b)
85. (d)
86. (d)
87. (d)
88. (d)
89. (c)
90. (b)
91. (a)
92. (c)
93. (b)
94. (c)
95. (c)
96. (d)
97. (b)
98. (a)
99. (d)
100. (b)
101. (c)
102. (c)
103. (d)
104. (d)
105. (a)
106. (b)
107. (a)
108. (b)
109. (b)
110. (c)
111. (c)
112. (c)
113. Practice
114. Practice
115. Practice
116. Practice
117. Practice Bottom of Form
118. Practice
119. (c)
120. (d)
121. (b)
122. (c)
123. 20 to 21
124. 2 8 6 to 293
125. (a)
126. 0.6
127. (b)
128. 19.10 to 19.25
129. Practice
130. Practice
131. Practice
132. Practice
133. (d)
134. 44.8 to 45.5
135. 0.000875 to 0.000885
136. 2.35 to 2.45
137. (d)
138. (a)
139. (c)
140. (d)
141. 1.25
142. (c)
143. (b)
144. (a)
145. (d)
146. 15
147. 14.25 to 14.65
148. (c)
149. 3.4 to 3.5
150. (c)
151. (a)
152. Practice
153. (d)
154. (b)

Chapter 1!

Surveying

1. **In the given figure Q is a right angle, PS:QS=3:1, RT:QT=5:2 and PU:UR=1:1 If area of triangle QTS is 20cm2, then the area of triangle PQR in cm2 is ———**



Answer : 280

2. **A back sight on a bench mark of RL 100.00 m on the floor of tunnel is 3.25m. The inverse staff reading on a roof station of the tunnel is 1.25m. The RL of the roof station in m is.....**
Answer: 104 to 105

3. **The angle in degrees at which a ridge line intersects contours is –**
(a) 0 (b) 30 (c) 45 (d) 90

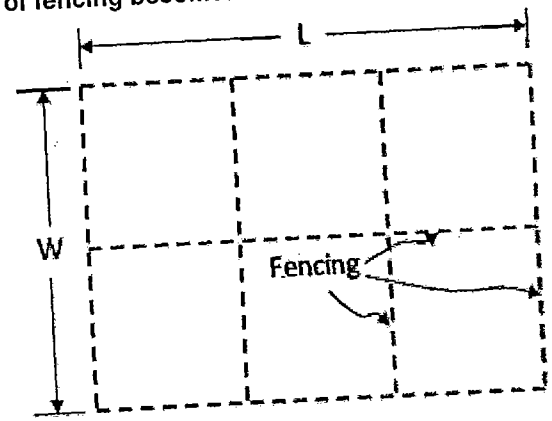
4. **In a triangle ABC, the bearings of the sides AB, BC and CA are 60°, 130°, and 270° respectively. The interior angles A,B, and C in degree respectively are –**
(a) 110, 40, 30 (b) 40,110,30 (c)30,40,110 (d) 30,110,40

5. **The stadia readings with horizontal sight on a vertical staff held at 50m from a tacheometer are 1.285 m and 1.780 m. The focal length of the object glass is 25cm. and the distance between the object glass and the vertical axis of the tacheometer is 15cm. The stadia interval in mm is.....**
Ans: 2.48 to 2.52

6. Vertical photographs of an area lying 500 m above the MSL (mean sea level) are to be taken at a scle of 1:20000 from an aircraft. If the camera has a focal length of 210mm. the flying height of the aircraft above the MSL in m is.....

Ans : 4700

7. A rectangular field of area 2000m2 is to be divided into 6 different plots by fencing as shown in the figure. The value of L in m. for which the total length of fencing becomes minimum is ———



Ans.: 161 to 165

8. The following observations are taken during a closed traverse.

Side	Length(m)	WCB
AB	100	90^0
BC	173	180^0
CA	200	330^0

The closing error of the traverse in mm is

(a) 205 (b) 20.5 (c) 2.05 (d) 0.205

9. The following observations are taken during a closed traverse.

Side	Length(m)	WCB
AB	100	90^0
BC	173	180^0
CA	200	330^0

The reduced bearing of the closing error in degrees is

(a) 87.21 (b) 64.03 (c) 14.04 (d) 0

10. A 20 m steel tape used in a mine survey is found to be 20 cm short when compared with a standard tape. If the measured volume of a dump using the tape is 4000 m^3, its actual volume in m^3 is

(a) 3881 (b) 3902 (c) 3920 (d) 4121

11. The boundary of a mine is plotted on a scale of 1:2000. If a planimeter measures the plotted area as 58 cm^2, the actual mine area in m^2 is

(a) 5800 (b) 11600 (c) 23200 (d) 29000

12. Transit theodolite is a

(A) micro-optic theodolite
(B) theodolite with face left and face right reading facilities
(C) theodolite with stadia hairs
(D)theodolite with two vertical circles

13. It is proposed to connect two straights of a road by a simple circular curve. If the maximum speed of the vehicle is 60 km/h and the centrifugal ratio for the road is 1/4, the minimum radius of the curve in m is –

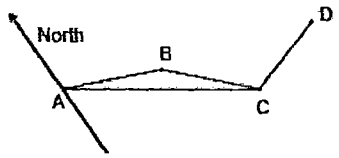
(a) 113.26 (b) 98.18 (c) 25.46 (d) 15.50

14. The boundary of a mine is plotted on a scale of 1:2000. If a planimeter measures the plotted area as 58 cm2, the actual mine area in m2 is

(a) 5800 (b) 11600 (c) 23200 (d) 29000

15. In an underground correlation survey by the Weisbach triangle (figure below) the following data are obtained. AB = 3.50 m, BC = 2.75 m, CA = 6.20 m, ACD = 179°14'33" , BCD = 179°10'17 " and bearing of AB =115°23'49 " . The bearing of traverse CD is

Ans : (a) 102°27'16" (b)114°41'49" (c) 115°27'16" (d) 179°14'16"



Ans : (a) 102°27'16" (b)114°41'49" (c) 115°27'16" (d) 179°14'16"

16. The lengths and standard errors of three sections AB, BC and CD of a straight line AD are given below :

AB = 125.85±0.021 m; BC= 205.72±0.0291 m, CD =246.21±0.025 m

The standard error in total length AD in m is –

(a) ±0.0436 (b) ±0.0350 (c) ±0.0250 (d) ±0.0019

17. The bearing of side AB of rectangular hexagon ABCDEF is S 50010'E. If the station C is easterly from the station B, the whole circle bearing of the side BC is
(a) 65°15'25" (b) 69°50'25" (c)69°15'25" (d) 69°50'0"

18. When we undertake preliminary inspection in the area to be surveyed is termed as -
(a) marking (b) reconnaissance
(c) staffing (d) triangulation

19. The principle behind chain surveying is -
(a) chaining (b) dialing (c) traversing (d) triangulation

20. The field work & plotting are done simultaneously in this graphical method of surveying -
(a) chain traversing (b) compass traversing
(c) theodolite reaversing (d) plane tabling

21. During chain surveying and plotting, we choose some shapes, name the shape-?
(a) equilateral triangle (b) square
(c) obtuse-angled triangle (d) rhombus

22. It is the device used for measuring fractional parts of the smallest division of the main scale
(a) comparative scale (b) diagonal scale
(c) vernier scale (d) shrunk scale

23. To determine, True North we use –
(a) Gyro apparatus (c) Observing Circumpolar Star
(b) GPS (d) All are true

24. National Grid is a system of rectangular co-ordinates used by this agency and based upon the Traverse Mercator projection. -
(a) Survey of India (b) GSI (c) DGMS (d) None

25. Check Surveys are important surveys required for ensuring correctness and accuracy of a plan already prepared. DGMS has issued Circulars for carrying out this survey when a working approaches -
(a) a Railway line (c) 120m or such greater distance from a water body
(b) a Goaf (d) None of the above

26. Representative factor (R.F) is the ratio of map distance to the corresponding ground distance. Find R.F., if the ground distance between two points in the ground is 100 m. and in the drawing the distance between the points representing the same is 10 cm.
(a) 1:1000 (b) 1:100 (c)1:10000 (d) None

27. The stations chosen on the main survey lines are called
(a) temporary stations (b) main stations
(c) subsidiary stations (d) None of the above

28. Subsidiary stations are joined by which lines ?
(a) main lines **(b) tie lines** (c) projected lines (d) straight lines

29. Fundamental principle of surveying is -
(a) working from part to the whole (b) working from whole to the part
(c) working through check lines (d) working through tie lines

30. The longest of the chain lines used in making a survey is generally known as
(a) triangular line (b) base line (c) tie line (d) offset line

31. Which line influences upon the straightness and accuracy of Chain Surveying?
(a) straight line (b) tie line (c) base line (d) check line

32. Line joining the apex of a triangle to some fixed point on the side opposite or a line joining some fixed points on any two sides of a triangle known as
(a) base line (b) check line (c) plotting line (d) tie line

33. A line which checks the accuracy of the framework and enables the surveyor to locate the interior details which are far away from the main chain lines is called as
(a) check line (b) tie line (c) perpendicular line (d) offset

34. In a survey, the position of the details such as boundaries, buildings, fences, roads, rivers, water bodies etc. measured by means of lateral measurements. These measurements are called
(a) proof line (b) offset (c) tie line (d) main line

35. How the building that is considerably oblique to the chain lines is located?
(a) check line (b) range tie
(c) range and check ties (d) fencing

36. Maximum length of the shorter offset when its direction is set out by eye or by swinging the tape on the chain line is -
(a) 1 m (b) 5 m (c) 10 m (d) 15 m

37. The length of a line measured using a 20 m chain was 610.2 m known to be 608.0. What was the actual length of the chain?
(a) 20.066 m (b) 20.012 m (c) 19.906 m (d) 19.928 m

38. Find the correction factor per 20 m chain for a line measured along a slope of 15°.
(a) 0.681 m (b) 0.678 m (c) 0.568 m (d) 0.786 m

39. The reduced bearing of a line is S 57o36' W. What will be the whole circle bearing of the
(a) 237°36' (b) 327°36' (c) 137°36' (d) 212°24'

40. The maximum permissible angular error in seconds in a closed underground traverse of 16 stations measured with a 20 seconds theodolite is
(a) 200 (b) 120 (c) 80 (d) 160

41. Name the surveying method based on trigonometry -
(a) plane surveying (b) triangulation
(c) contouring (d) techeometric surveying

42. It is a method of leveling adopted to determine the level difference between two points at a considerable distance apart with great precision
(a) hypsometry (b) profile leveling
(c) reciprocal leveling (d) trigonometrical leveling

43. The small compact hand instrument used for accurately finding the foot of the perpendicular from a given point to a line and setting out a right angle at a given point on a line. The instrument is known as
(a) cross staff (b) French cross staff
(c) optical square (d) dial

44. The art of determining the relative heights or elevations of points or objects on the earths surface is known as
(a) leveling (b) reconnassing (c) staffing (d) checking

45. A fixed reference point of known elevation is called
(a) vertical level (b) horizontal level (c) bench mark (d) axis

46. The staff reading taken on a point of unknown elevation from the same set up of the level is known as
(a) back sight (b) fore sight
(c) intermediate sight (d) change point

47. When the instrument is correctly leveled then height of plane of collimation is synonymous with
(a) plus sight (b) height of instrument
(c) turning point (d) intermediate sight

48. Which of the following is not a level?
(a) dumpy level (b) wye level (c) tilting level (d) miners level

49. Which is used when leveling of the highest precision is required?
(a) telescope (b) invar staff (c) tape (d) object glass

50. Find out the leveling in which the change in atmospheric pressure is recorded?
(a) trigonometrical leveling (b) profile leveling
(c) differential leveling (d) barometric leveling

51. Which of the following system is used to working out the reduced levels of points from the staff readings taken in the field?
(a) bench marking (b) ranging system
(c) rise and fall system (d) reconnaissance

52. The observed reading on a staff held at A was 3.5m. The staff was found to be 50 cm of the vertical through its bottom. Find the correct staff reading at A?
(a) 2 m (b) 2.464 m (c) 3.464 m (d) 4 m

53. The RL of the floor is 100.5; staff reading on the floor 1.5; reading on the staff held upside down against the underside of the tee-beam is 3.5. Find the height of the beam above the floor level?
(a) 2 m (b) 3 m (c) 4 m (d) 5 m

54. In leveling between two points A & B on opencast mine, the level set up near A and the staff readings on A and B were 2.5 m and 3.7 m respectively. The level was then moved and set up near B, and the respective staff readings on A and B were 2.0 m and 3.0 m. Find the true difference of level A and B.
(a) 1.0 m (b) 1.1 m (c) 0.6 m (d) 1.3 m

55. It is the method of leveling in which the heights of mountains are found by observing the temperature at which water boils. The method is called
(a) profile leveling (b) check leveling
(c) hypsometry (d) tacheometry

56. **Find the corrections for curvature for a distance of 2 km?**
(a) 0.214 m (b) 0.314 m (c) 1.04 m (d) 4 m

57. **The method of leveling adopted to determine the difference of level between two points at a considerable distance apart with great precision is known as**
(a) reciprocal leveling (b) cross-sectioning
(c) check leveling (d) differential leveling

58. **Contour lines are defined as?**
(a) the lines which meet each other at certain point
(b) lines made to have knowledge on the extent of extraction made in opencast mines
(c) lines formed by joining points of equal height above MSL and they be straight, wavy etc depending on the configuration of land surface
(d) lines made only to see the gentle slope of the ground

59. **The elevations and depressions of the surface of the ground are shown on a map by means of any one of the following lines. Name the line?**
(a) object (b) collimation (c) contour (d) back sight

60. **When contour lines lie closer -**
(a) indicates slope of land is gentle (b) indicates slope of land is steep
(c) indicates land is flat (d) None of the above

61. **The error due to imperfect focusing of the eyepiece and object glass is known as**
(a) errors due to level and staff (b) errors in sighting
(c) errors due to focusing tube (d) error in bubble tube

62. **Name the method which is particularly suitable when a contoured map of hill is required**
(a) by squares method (b) tachometric method
(c) cross-section (d) indirect method

63. **It is the art of determining and representing the relative heights or elevations of different points on the surface of the earth in a vertical plane**
(a) surveying (b) leveling (c) scaling (d) correlating

64. **It is a simple device attached to the wheel of any vehicle and registers the number of revolutions of the wheel. Knowing the circumference of the wheel, the distance traversed may be obtained**
(a) passometer (b) pedometer (c) speedometer (d) odometer

65. **Odometer is used measurement of**
(a) Distance (b) Pressure (c) Temperature (d) None

66. **For highest precision, which of the following tape is used for measuring b lines in triangulation?**
(a) synthetic tape (b) invar tape (c) linen tape (d) steel tape

67. **The length of a measured by means of a 30m chain as found to be 590.2 instead of its known to be as 602.5m. What was the actual length of the cha**
(a) 30.26 m (b) 30.36 m (c) 30.42 m (d) 30.62 m

68. **A 25 m chain was found to be 0.05 m too long after chaining 1200m. It w found to be 0.2m too long after chaining 2000m. If the chain was correct bef commencement of the work find the true distance?**
(a) 2001.2 m (b) 2002.2 m (c) 2003.2 m (d) 2005.2 m

69. **A 100m tape is held 1.5m out of line. What is the true length?**
(a) 98.98 m (b) 98.89 m (c) 99.89 m (d) 99.98 m

70. **In traverse surveying the directions of survey lines are fixed by**
(a) forming a network of triangles (b) angular measurements
(c) running of check lines (d) arranging equilateral triangles

71. **The horizontal angle between the true meridian and a line is called**
(a) magnetic meridian (b) arbitrary meridian
(c) azimuth (d) whole circle angle

72. **Every line has two bearings e.g. fore bearing and back bearing. If fore bearir is less than 180° then what will be the back bearing?**
(a) back bearing = fore bearing – 180° (b) back bearing = fore bearing + 18
(c) back bearing = fore bearing (d) back bearing = 180° – fore bearir

73. **The bearing of line AB is 146° 20′ and the angle ABC is 132° 24′. What is th bearing of BC?**
(a) 88° 44′ (b) 92° 44′ (c) 98° 44′ (d) 108° 44′

74. **Indicate the true statement for theodolite?**
(a) measures horizontal angle only (b) measures vertical angle only
(c) measures both horizontal and vertical angles
(d) None of the above

75. **In ordinary precisions, which of the following error is negligible?**
(a) error of closure (b) instrumental error
(c) natural error (d) personal error

76. By which rule, the total error in latitude and departure is distributed in proportion to the length of the sides?
(a) transit rule (b) bowditch rule
(c) centesimal rule (d) reversal point rule

77. Pick out the disadvantage for plane babbling?
(a) it is suibtable for preparing small scale maps
(b) it is most rapid
(c) it is not suitable for work in wet climate
(d) contours and irregular objects may be represented accurately

78. Tachometry is a branch of angular surveying in which one of the following is entirely eliminated?
(a) horizontal distances of points are measured
(b) vertical distances of points are measured
(c) chaining is done more accurately
(d) primary objective is to prepare contoured maps

79. Fixed hair and movable hair methods are the classifications of which method of tachometry?
(a) tangential method (b) stadia method
(c) inclined sights (d) vernier scaling method

80. A tachometer survey is mainly conducted for the purpose of
(a) contouring and filling in detail
(b) calculating the deflection angles with the help of theodolite and chain
(c) chaining in a smooth ground more accurately
(d) setting the curve over rough ground with theodolite

81. In tachometric observations, the staff readings are found to be 2.4 m, 3.0 m and 3.6 m. If the angle of elevation is 45, the multiplying factor is 100 and the additive constant is 0.3m then horizontal distance between the staff and the instrument station, expressed in m is
(a) 30.20 (b) 59.76 (c) 60.19 (d) 73.21

82. Nautical mile is expressed as -
(a) the distance measuring two points between north and south pole
(b) distance measured along the great circle joining two points which subtend one minute or arc at the centre of the earth
(c) distance measured along the great circle joining two points which subtend one second of arc at any point on the circumference of the earth
(d) the distance between earth and moon

83. Satellite orbits are inclined at an angle of 55o from
(a) Greenwich meridian (b) Equator
(c) Specific latitude (d) Specific longitude

84. What is the celestial pole?
(a) It is the rotation of all celestial bodies from north pole to south pole of earth
(b) it is the rotation of all celestial bodies from east to west around the sun
(c) revolution of all celestial bodies from east to west round a point called celestial pole
(d) it is an imaginary sphere upon the earth's surface

85. It is the instrument used in determining the area of the plots especially when the boundaries are irregular or curved
(a) compass (b) coniometer (c) theodolite (d) planimeter

86. The difference in the planimeter readings was 0.896 when the area of 100 sq.cm was measured by a planimeter with the anchor outside. With the same of the tracing arm and with anchor outside, another figure was traversed clockwise and the difference between the initial and final readings was found to be 1.86. What is the area of the figure?
(a) 187.58 (b) 197.58 (c) 207.58 (d) 227.58

86. What is the most fundamental adjustment of any leveling instrument?
(a) the line of collimation and the axis of the telescope should not coincide with one another
(b) the line of collimation should be parallel to the bubble axix
(c) the bubble axis should not be perpendicular to the vertical axis
(d) the line of collimation should not be parallel to bubble axis

87. The principle of reversal for level and theodolite is
(a) if there is any error in a certain part of the instrument, it is doubled by reversing the position of the instrument
(b) even though the instrument is out of adjustment accurate results can be obtained by reversing the observations
(c) for any instrumental error, take the average of two observations taken at reversal
(d) for any instrumental error, take the average of any two observation and double it

88. The following consecutive staff readings were taken with a theodolite on continuously sloping ground at a common interval of 30 m : 0.5 on A, 1.3, 2.2, 16, 2.8 on B
If the elevation of A is 510 m, what will be the elevation of point B?
(a) 496.7 m (b) 504.2 m (c) 507.7 m (d) 503.8 m

89. **Transit theodolite is a**
(a) micro-optic theodolite
(b) theodolite with face left and face right reading facilities
(c) theodolite with stadia hairs
(d) theodolite with two vertical circles

90. **A theodolite was set up at a distance of 150m from tower. The angle of elevation to the top of the parapet was 10.8′ while the angle of depression to the foot of the wall was 3°12′. Find the height of the tower?**
(a) 31.18 m (b) 33.48 m (c) 35.18 m (d) 40.28 m

91. **It is a minor instrument capable of measuring angle upto 120° and reads to 1 minute**
(a) not to place the line of collimation in the axis of the telescope
(b) to place the line of collimation at right angles to the vertical axis
(c) to place the line of collimation at right angles to the horizontal axis
(d) not to make the axis of the bubble perpendicular to the vertical axis

92. **It is a minor instrument capable of measuring angles upto 120° and reads to 1 minute**
(a) Y level (b) box sextant (c) dumpy level (d) tilting level

93. **In weissbach triangle method of correlation, number of shafts used for correlation are -**
(a) one (b) two (c) three (d) four

Mine Surveying

94. **In shaft plumbing, the plumb bobs are immersed in a bucket of water to prevent–**
(a) oscillation of wires
(b) effect of ventilation current
(c) kinking of wires
(d) None of the above

95. **What do you mean by subsidence surveying?**
(a) shifting to surface structure to enable mining operation
(b) depression of the surface as a result of mining operation
(c) it is the art of finding out the magnitude of subsidence
(d) it is the procedure to know the amount coal taken out vis-a-vis the area of mining in underground

96. **Which of the following is important in relation to subsidence surveying?**
(a) to measure change in height of different surface
(b) to locate depressions
(c) to selecting the site of observation stations
(d) the measuring the angles of different positions on surface

97. **In relation to subsidence; it is obvious that the angle of draw determines the**
(a) volume of coal extracted from below the ground
(b) depth of the area of influence
(c) size of the area of influence
(d) effect of strains on the surface structures

98. **In longwall working in a flat measures, in order to get greater part of information, a single observation line should be laid**
(a) at any positions
(b) at right angles to the direction of advance
(c) at any direction parallel to the advance
(d) at a direction parallel to the top gate road

99. **Which factors do not have any control to laying out observation lines in subsidence surveying?**
(a) shape and size of the subsidence area exposed on the surface
(b) method of extraction whether longwall or bord and pillar
(c) nature of ground surface
(d) distance of the depressed ground from the entrance of mine

100. **In Bord & Pillar working or in places where the nature of subsidence is exposed to be irregular it is a good practice to**
(a) arrange for one observation line
(b) divide whole area into squares and to arrange for two sets of parallel observation lines
(c) select some angular points at right angles to the tail gate
(d) provide stations at irregular distance apart

101. **The combined effect of curvature and refraction in leveling is an error which is**
(a) additive (b) subtractive
(c) multiplicative (d) divisive

102. **For precise leveling, some standards as laid down by the International Geodetic Association should be adopted; which is as**
(a) $\sqrt{\text{length of line in miles x 2}}$
(b) $1.2\text{mm} \times \sqrt{\text{length of line in miles x 2}}$
(c) $1.75\text{mm} \times \sqrt{\text{length of line in miles x 2}}$
(d) $2\text{mm} \times \sqrt{\text{length of line in miles x 2}}$

103. The inclination of a bed from horizontal dip when observed in any direction and being lesser than the full dip, it is the -
(a) strike (b) full dip (c) apparent dip (d) fault

104. The characteristic feature of a fault is such that the ends of the broken strata overlap and the seam is duplicated along the line of the fault. Identify its type?
(a) reversed fault (b) normal fault (c) cross-cut (d) drift

105. This is an instrument used for mechanically reducing, copying or enlarging plans in any desired proportion within its range. Name the instrument
(a) planimeter (b) eidograph (c) coniometer (d) compass

106. GIS is -
(a) geological information system (b) geodetic informational system
(c) geographic information system (d) global information system

107. The basic concept behind GPS is
(a) Triangulation (b) Trilateration (c) Traverse (d) Tachometry

108. Significant technological advances in the field of exploration and surveying have been in the form of
(a) Gyro-theodolite (b) EDM
(c) GPS (d) Laser planer

109. Which of the following survey instruments is designed to work based on the satellite?
(a) EDM (b) Gyro (c) GPS (d) None

110. The GPS satellites orbital planes are inclined to the equator and spaced in the longitude.
The inclination and the spacing of the longitude in degrees are
(a) 45° & 55° (b) 55° & 60° (c) 60° & 55° (d) 60° & 60°

111. GPS gives height from -
(a) WGS83 (b) WGS84 (c) WGS85 (d) None

112. What will be the correction for refraction for a distance of 800 m, if the diameter of the
(a) -0.007 m (b) +0.007 m (c) -0.7 m (d) +0.7 m

113. What is the combined correction for curvature and refraction for a distance of 1200 m, if the diameter of the earth is 1200 km?
(a) -0.103 m (b) +0.103 m (c) -1.030 m (d) +1.030 m

113. Determine the flying height of an aeroplane to obtain the average scale of the photograph equal 1/7200. Ground surface elevations vary from 160 to 430 m. Focal length of the
(a) 1397 (b) 1497 (c) 1243 (d) 1359

114. The scale of Q photograph is 1:100. The photograph size is 23 cm X 23cm. Determine the number of photographs overlap is 60% and side overlap is 30%.
(a) 102 (b) 101 (c) 103 (d) 106

115. An image of the top of a building is 90mm from the principal point of the photograph. The elevation of the top of the building is 500 m and the flying height is 5000 m above the datum level. Determine the relief displacement.
(a) 9 mm (b) 11 mm (c) 13 mm (d) 7 mm

116. A line 2500 m long lying at an elevation of 450 m measures 10 cm on a vertical photograph. The focal length of the camera is 20cm. Determine the scale of the photograph for the area having an elevation of 1000 m.
(a) 1:24890 (b) 1:22980 (c) 1:26990 (d) 1:21990

117. A line measures 10 cm on a photograph taken with a camera having a focal length of 20 cm. The same line measures 3 cm on a map drawn to a scale of 1:50000. Calculate the flying height of the aircraft if the average altitude of the ground is 320 m.
(a) 3020 m (b) 4050 m (c) 5000 m (d) 3320 m

118. If h is the difference in level between end points separated by l, then the slope correction $\frac{h^2}{2l} + \frac{h^4}{8l^3}$ is The second term may be neglected if the value of h in a 20m distance is less than
(a) ½ m (b) 1 m (c) 2m (d) 3 m

119. An ideal vertical curve to join two gradients, is
(a) circular (b) parabolic (c) elliptical (d) hyperbolic

120. Pick up the correct statement from the following :
(a) the eyepiece plays no part in defining the line of sight
(b) the diaphragm plays no part in defining the line of sight
(c) the optical centre of the objective plays no part in defining the line of sight
(d)none of these.

121. The intercept of a staff
(a) is maximum if the staff is held truly normal to the line of sight.
(b) is minimum if the staff is held truly normal to the line of sight.
(c) decreases if the staff is tilted away from normal
(d) increases if the staff is tilted towards normal.

122. The radius of curvature of the arc of the bubble tube is generally kept
(a) 10 m (b) 25 m (c) 50 m (d) 100 m

123. If S is the length of a subchord and R is the radius of simple curve, the angle of deflection between its tangent and sub-chord, in minutes, is equal to
(a)573 S/R (b) 573 R/S (c) 171.9 S/R (d) 1718.9 R/S
(e) 1718.9 S/R.

124. The real image of an object formed by the objective, must lie
(a) in the plane of cross hairs
(b) at the centre of the telescope
(c) at the optical centre of the eye-piece
(d) anywhere inside the telescope.

125. In chain surveying tie lines are primarily provided
(a) to check the accuracy of the survey
(b) to take offsets for detail survey
(c) to avoid long offsets from chain lines
(d) to increase the number of chain lines.

126. Pick up the correct statement from the following :
(a) the tangent screw enables to give small movement under conditions of smooth and positive control
(b) standing on the tripod is the levelling head or trib arch
(c) the levelling screws are used to tilt the instrument so that its rotation axis is truly vertical
(d) all the above.

127. One of the Lehmann's rules of plane tabling, is
(a) location of the instrument station is always distant from each of the three rays from the known points in proportion to their distances
(b) when looking in the direction of each of the given points, the instrument station will be on the right side of one and left side of the other ray
(c) when the instrument station is outside the circumscribing circle its location is always on the opposite side of the ray to the most distant point as the inter-section of the other two rays
(d) none of these.

128. If f1 and f2 are the distances from the optical centre of a convex lens of focal length f to conjugate two points P1 and P2 respectively, the following relationship holds good
(a) f = f1 + f2 (b) f = (f1 + f2)
(c) $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$ (d)none of these.

129. The accuracy of measurement in chain surveying, does not depend upon
(a) length of the offset (b) scale of the plotting
(c) importance of the features (d) general layout of the chain lines.

130. If arithmetic sum of latitudes of a closed traverse is "Lat and closing error in latitude is dx, the correction for a side whose latitude is l, as given by Transit Rule, is
(a) $l \times \frac{dx}{\Sigma Lat}$ (b) $l \times \frac{\Sigma Lat}{dx}$
(c) $\Sigma Lat \times \frac{dx}{l}$ (d)none of these.

131. Closed contours of decreasing values towards their centre, represent
(a) hill (b) a depression
(c) a saddle or pass (d) a river bed.

132. If a 30 m chain diverges through a perpendicular distance d from its correct alignment, the error in length, is
(a) $\frac{d^2}{60}$ m (b) $\frac{d^2}{30}$ m (c) $\frac{d^2}{40}$ m (d) $\frac{d}{30}$ m

133. Diopter is the power of a lens having a focal length of
(a) 25 cm (b) 50 cm (c) 75 cm (d) 100 cm

134. An imaginary line joining the points of equal elevation on the surface of the earth, represents
(a) contour surface (b) contour gradient (c) contour line (d) level line

135. The 'fix' of a plane table station with three known points, is bad if the plane table station lies
(a) in the great triangle
(b) outside the great triangle
(c) on the circumference of the circumscribing circle
(d) none of these.

136. If R is the radius of the main curve, è the angle of deflection, S the shift and L the length of the transition curve, then, total tangent length of the curve, is

(a) (R - S) tan θ/2 - L/2 (b) (R + S) tan θ/2 - L/2
(c) (R + S) tan θ/2 + L/2 (d) (R - S) tan θ/2 + L/2

137. In chain surveying field work is limited to

(a) linear measurements only (b) angular measurements only
(c) both linear and angular measurements (d) all the above.

138. Two concave lenses of 60 cm focal length are cemented on either side of a convex lens of 15 cm focal length. The focal length of the combination is

(a) 10 cm (b) 20 cm (c) 30 cm (d) 40 cm

139. If è is the vertical angle of an inclined sight, ä is the angle of tilt of the staff, the error

(a) $E = 1 - \frac{\cos(\theta \pm \delta)}{\cos\theta}$ (b) $E = 1 - \frac{\sin(\theta \pm \delta)}{\sin\theta}$

(c) $E = 1 - \frac{\tan(\theta \pm \delta)}{\tan\theta}$ (d) none of these.

140. One of the tacheometric constants is additive, the other constant, is

(a) subtractive constant (b) multiplying constant
(c) dividing constant (d) indicative constant.

141. The limiting length of an offset does not depend upon

(a) accuracy of the work (b) method of setting out perpendiculars
(c) scale of plotting (d) indefinite features to be surveyed.

142. In quadrantal bearing system, back bearing of a line may be obtained from its forward bearing, by

(a) adding 180°, if the given bearing is less than 180°
(b) subtracting 180°, if the given bearing, is more than 180°
(c) changing the cardinal points, i.e. substituting N for S and E for W and vice-versa
(d) none of these.

143. If L is the perimeter of a closed traverse, ÃD is the closing error in departure, the correction for the departure of a traverse side of length l, according to Bowditch rule, is

(a) $\Delta D \times \frac{L}{l}$ (b) $\Delta D \times \frac{l^2}{L}$

(c) $L \times \frac{l}{\Delta D}$ **(d)** $\Delta D \times \frac{l}{L}$

144. Pick up the correct statement from the following:

(a) the theodolite in which telescope can be rotated in vertical plane is called atransmit
(b) when the vertical circle is to the left of the telescope during observation, it is called to be in left face
(c) when the vertical circle is to the right of the telescope during observation, it is called to be in right face
(d) all the above.

145. Pick up the method of surveying in which field observations and plotting proceed simultaneously from the following

(a) chain surveying (b) compass surveying
(c) plan table surveying (d) tacheometric surveying.

146. While viewing through a level telescope and moving the eye slightly, a relative movement occurs between the image of the levelling staff and the cross hairs. The instrument is

(a) correctly focused (b) not correctly focused
(c) said to have parallax (d) free from parallax.

147. Accuracy of 'fix' by two point problem, is

(a) Bad (b) Good (c) not reliable (d) unique.

148. A bearing of a line is also known as

(a) magnetic bearing (b) true bearing (c) azimuth (d) reduced bearing

149. True meridians are generally preferred to magnetic meridians because

(a) these converge to a point (b) these change due to change in time
(c) these remain constant. (d)None of these.

150. Pick up the correct statement from the following :

(a) the apparent error on reversal is twice the actual error
(b) the correction may be made equal to half the observed discrepancy.
(c) the good results may be obtained from a defective instrument by reversing and taking the mean of two erroneous results
(d) all the above.

151. If è is the slope of the ground and l is the measured distance, the correction is

(a) 2l sin2 θ/2 (b) 2l cos2 θ/2 (c) 2l tan2 θ/2 (d) 2l cot2 θ/2.

152. The most reliable method of plotting a theodolite traverse, is

(a) by consecutive co-ordinates of each station
(b) by independent co-ordinates of each station
(c) by plotting included angles and scaling off each traverse leg
(d) by the tangent method of plotting.

153. The difference of level between a point below the plane of sight and one above, is the sum oftwo staff readings and an error would be produced equal to
(a) the distance between the zero of gradient and the foot of the staff
(b) twice the distance between the zero of graduation and the foot of the staff
(c) thrice the distance between the zero of graduation and the foot of the staff
(d) none of the above.

154. Offsets are measured with an accuracy of 1 in 40. If the point on the paper from both sources of error (due to angular and measurement errors) is not to exceed 0.05 cm on a scale of 1 cm = 20 m, the maximum length of offset should be limited to
(a) 14.14 (b) 28.28 m (c) 200 m (d) none of these.

155. The probable error of the adjusted bearing at the middle is
(a) $\frac{1}{2}$ rn (b) $\frac{1}{3}$ rn (c) $\frac{1}{4}$ rn (d) $\frac{1}{5}$ rn.

156. The bearings of the lines AB and BC are 146° 30' and 68° 30'. The included angle ABC is
(a) 102° (b) 78° (c) 45° (d) none of these.

157. For a closed traverse the omitted measurements may be calculated
(a) length of one side only (b) bearing of one side only
(c) both length and bearing of one side (d) length or bearing of adjacent side
(e) all the above.

158. The slope correction for a length of 30 m along a gradient of 1 in 20, is
(a) 3.75 cm (b) 0.375 cm (c) 37.5 cm (d) 2.75 cm.

159. The main principle of surveying is to work
(a) from part to the whole (b) from whole to the part
(c) from higher level to the lower level (d) from lower level to higher level.

160. For the construction of highway (or railway)
(a) longitudinal sections are required (b) cross sections are required
(c) both longitudinal and cross sections are required
(d) none of these.

161. If the radius of a simple curve is R, the length of the chord for calculating offsets by the method of chords produced, should not exceed.
(a) R/10 (b) R/15 (c) R/20 (d) R/25.

162. The sensitiveness of a level tube decreases if
(a) radius of curvature of its inner surface is increased
(b) diameter of the tube is increased
(c) length of the vapour bubble is increased
(d) both viscosity and surface tension are increased.

163. For true difference in elevations between two points A and B, the level must be set up
(a) at any point between A and B (b) at the exact mid point of A and B
(c) near the point A (d) near the point B.

164. ABCD is a regular parallelogram plot of land whose angle BAD is 60°. If the bearing of the line AB is 30°, the bearing of CD, is
(a) 90° (b) 120° (c) 210° (d) 270°

165. Keeping the instrument height as 1.5 m, length of staff 4 m, the slope of the ground as 1 in 10, the sight on the down-slope, must be less than
(a) 30 m (b) 25 m (c) 20 m (d) 15 m

166. Pick up the correct statement from the following :
(a) Box sextant is used for the measurement of horizontal angles
(b) Cross staff is used for setting out right angles
(c) Gradiometer is used for setting out any required gradient
(d) Line ranger is used for locating intermediate stations on a survey line
(e) All the above.

167. An ideal transition curve is
(a) cubic parabola (b) cubic spiral (c) clothoid spiral (d) true spiral.

168. Pantagraph is used for
(a) measuring distances (b) measuring areas
(c) enlarging or reducing plans (d) setting out right angles

169. If the angular measurements of a traverse are more precise than its linear measurements, balancing of the traverse, is done by
(a) Bowditch's rule (b) Transit rule (c) Empirical rule (d) all of the above.

170. The branch of surveying in which both horizontal and vertical positions of a point, are determined by making instrumental observations, is known
(a) tacheometry (b) tachemetry (c) telemetry (d) all the above.

171. **In levelling operation**
(a) when the instrument is being shifted, the staff must not be moved
(b) when the staff is being carried forward, the instrument must remain stationary
(c) both (a) and (b) (d) neither (a) nor (b).

172. **If the rate of gain of radial acceleration is 0.3 m per sec3 and full centrifugal ratio is developed. On the curve the ratio of the length of the transition curve of same radius on road and railway, is**
(a) 2.828 (b) 3.828 (c) 1.828 (d) 0.828.

173. **The angle between two plane mirrors of optical square, is**
(a) 20° (b) 30° (c) 45° (d) 60°

174. **The latitude of a traverse leg is obtained by multiplying its length by**
(a) tangent of its reduced bearing (b) sign of its reduced bearing
(c) cosine of its reduced bearing (d) cosecant of its reduced bearing.

175. **For a curve of radius 100 m and normal chord 10 m, the Rankine's deflection angle, is**
(a) 0°25'.95 (b) 1°25'.95 (c) 1°35'.95 (d) 1°45'.95.

176. **A uniform slope was measured by the method of stepping. If the difference in level between two points is 1.8 m and the slope distance between them is 15 m, the error is approximately equal to**
(a) cumulative, + 0.11 m (b) compensating, ± 0.11 m
(c) cumulative, - 0.11 m (d) none of these

177. **In optical reading instruments**
(a) the vertical circle is usually continuous from 0° to 359°
(b) the readings increase when the telescope is elevated in the face left position
(c) the readings decrease when the telescope is elevated in the face right position
(d) all the above.

178. **For setting out a simple curve, using two theodolites.**
(a) offsets from tangents are required
(b) offsets from chord produced are required
(c) deflection angles from Rankine's formula are required
(d) none of these.

179. **Geodetic surveying is undertaken**
(a) for production of accurate maps of wide areas
(b) for developing the science of geodesy
(c) making use of most accurate instruments and methods of observation
(d) for determination of accurate positions on the earth's surface of system of control points (d) all the above.

180. **The desired sensitivity of a bubble tube with 2 mm divisions is 30". The radius of the bubble tube should be**
(a) 13.75 m (b) 3.44 m (c) 1375 m (d) none of these.

181. **A dumpy level was set up at the midpoint between two pegs A and B, 50 m apart and the staff readings at A and B were 1.22 and 1.06. With the level set up a A, the readings at Aand B were 1.55 and 1.37. The collimation error per 100 m length of sight is**
(a) 0.02 m inclined upwards (b) 0.04 m inclined downwards
(c) 0.04 m inclined upward (d) none of these.

182. **Keeping the instrument height as $1\frac{1}{2}$ m, length of staff 4 m, the up gradient of the ground 1 in 10, the sight on the up slope must be less than**
(a) 25 cm (b) 20 m (c) 45 m (d) 10 m

183. **True meridian of different places**
(a) converge from the south pole to the north pole
(b) converge from the north pole to the south pole
(c) converge from the equator to the poles
(d) run parallel to each other.

184. **Let angular value of one graduation of a tube of length x be ö seconds and R be the radius of its internal curved surface, then**
(a) $\varphi = \frac{x}{206265\,R}$ (b) $\varphi = \frac{R}{206265\,x}$
(c) $\varphi = \frac{x.R}{206265}$ (d) $\varphi = \frac{206265}{x.R}$

185. **Pick up the correct statement from the following :**
(a) the length of the brass handle is included in the length of chain
(b) the handles are on swivel joints to prevent twisting of the chain
(c) the fifth tag from either end of the chain is numbered 5
(d) the length of the Gunter's chain is 66 ft.
(e) all the above.

186. **Two hill tops A and B 20 km apart are intervened by a third top C. If the top most contour of the three hill tops are of the same value, state whether the line of sight AB**
(a) passes clear of hill top C (b) passes below the hill top C
(c) grazes the hill top C (d) none of these.

187. Centering error of a theodolite produces an error

(a) in all angles equally
(b) which does not vary with the direction or pointing
(c) which varies with the direction of pointing and inversely with the length of sight
(d) none of these.

188. In levelling operation

(a) if second reading is more than first, it represents a rise
(b) if first reading is more than second, it represents a rise
(c) if first reading is less than second, it represents a fall
(d) if second reading is less than first, it represents a fall
(e) both (b) and (c).

189. A tape of length l and weight W kg/m is suspended at its ends with a pull of P kg, the sag correction is

(a) $\frac{l^3W^2}{24p^2}$ (b) $\frac{l^2W^3}{24p^2}$ (c) $\frac{l^2W^2}{24p^3}$ (d) $\frac{lW^2}{24P}$

190. Pick up the correct statement from the following :

(a) in astronomical telescope, the rays from the object after refraction at the objective are brought to a focus before entering the eyepiece to produce a real inverted image in front of the eye piece
(b) in Galileo's telescope, the rays from the object get refracted at the objective and are intercepted by the eyepiece before a real image is formed
(c) a line passing through the optical centre of the objective traversing through the eyepiece, is called line of sight
(d) the line of sight which passes through the intersection of cross-lines marked on a diaphragm fixed in front of the eyepiece in a plane at right-angles to the axis, is called the line of collimation
(e) all the above.

Answer Key

1. 280
2. 104 to 105
3. (d)
4. (d)
5. 2.48 to 2.52
6. 4700
7. 161 to 165
8. (a)
9. (a)
10. (a)
11. (c)
12. (b)
13.
14.
15. (a)
102°27'16"
(b)
114°41'49"
(c)
115°27'16"
(d)
179°14'16"
16. (a)
17. (d)
18. (b)
19. (d)
20. (d)
21. (a)
22. (c)
23. (d)
24. (a)
25. (c)
26. (a)
27. (c)
28. (b)
29. (b)
30. (b)
31. (c)
32. (b)
33. (b)
34. (b)
35. (c)
36. (d)
37. (d)
38. (a)
39. (a)
40. (c)
41. (b)
42. (c)
43.
44. (c)
45. (c)
46. (c)
47. (b)
48. (d)
49. (b)
50. (d)
51. (c)
52. (c)
53. (d)
54. (b)
55. (c)
56. (b)
57. (a)
58. (c)
59. (c)
60. (b)
61. (b)
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64. (d)
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67. (d)
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69. (d)
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71. (c)
72. (b)
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83. (b)
84. (c)
85. (d)
86. (c)
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88. (c)
89. (b)
90. (c)
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92. (b)
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95. (c)
96. (c)
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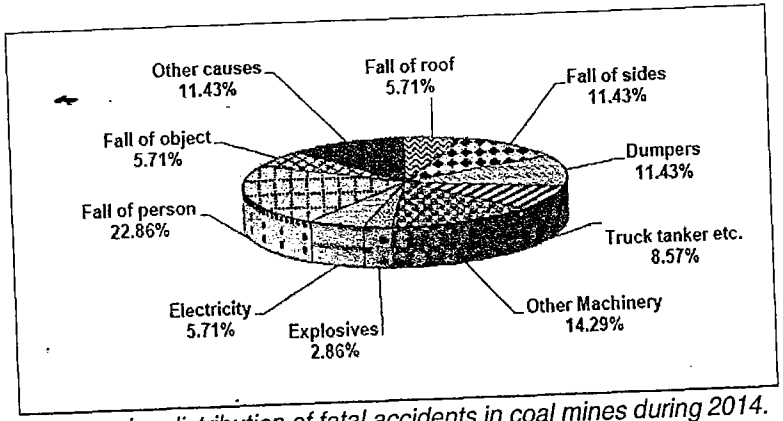
100. (b)
101. (b)
102. (c)
103. (c)
104.
105. (a)
106. (c)
107. (a)
108. (c)
109. (c)
110. (b)
111. (b)
112. (b)
113. (a)
114. (b)
115. (a)
116. (d)
117. (d)
118. (d)
119. (b)
120. (a)
121. (b)
122. (d)
123. (e)
124. (a)
125. (c)
126. (d)
127. (a)
128. (c)
129. (d)
130. (a)
131. (b)
132. (a)
133. (d)
134. (c)
135. (c)
136. (c)
137. (a)
138. (c)
139. (a)
140. (b)
141. (d)
142. (c)
143. (d)
144. (d)
145. (c)
146. (c)
147. (c)
148. (b)
149. (c)
150. (d)
151. (a)
152. (b)
153. (b)
154. (b)
155. (a)
156. (a)
157. (e)
158. (a)
159. (b)
160. (c)
161. (c)
162. (d)
163. (b)
164. (c)
165. (b)
166. (e)
167. (c)
168. (c)
169. (b)
170. (d)
171. (c)
172. (a)
173. (c)
174. (c)
175. (d)
176. (a)
177. (d)
178. (d)
179. (a)
180. (a)
181. (b)
182. (c)
183. (c)
184. (a)
185. (e)
186. (b)
187.
188.
189. (d)
190.

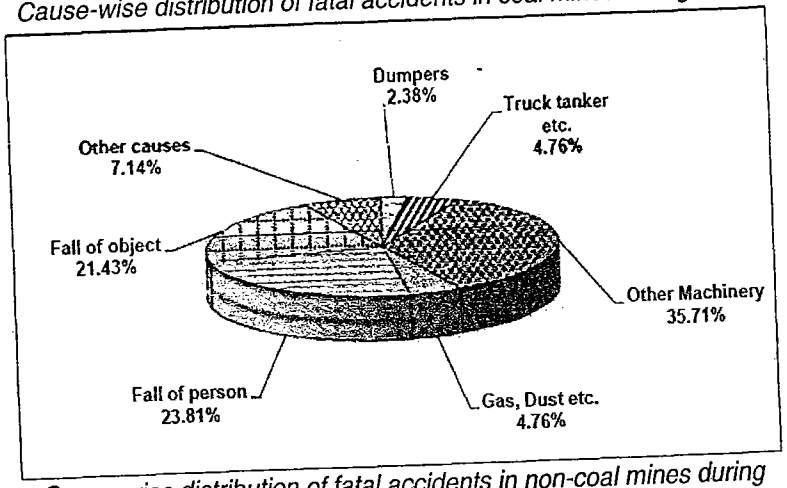
Chapter 16

Some Important Information on Mines Safety

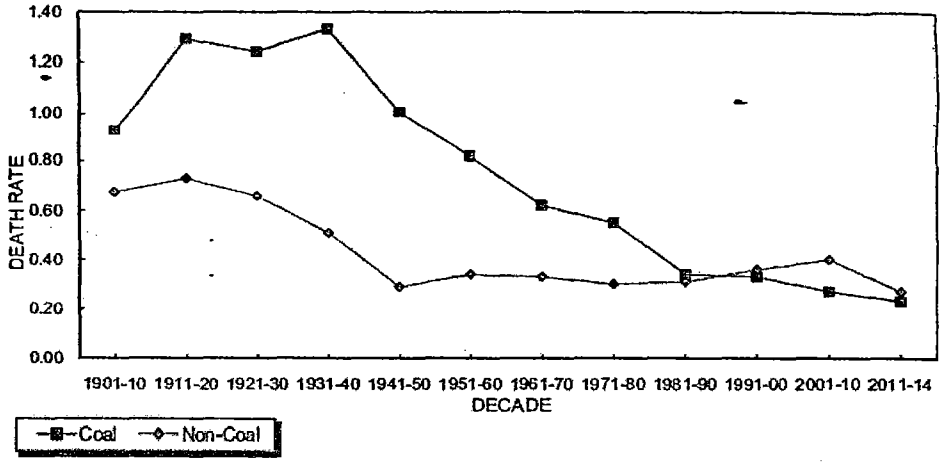
{For the benefit of our readers, we are placing below some of the latest statistics on Accidents in Mines (both Coal & Non-Coal). These have been from the 'Standard Note 1.1.2015' brought out by DGMS and are available in the web site of DGMS.}



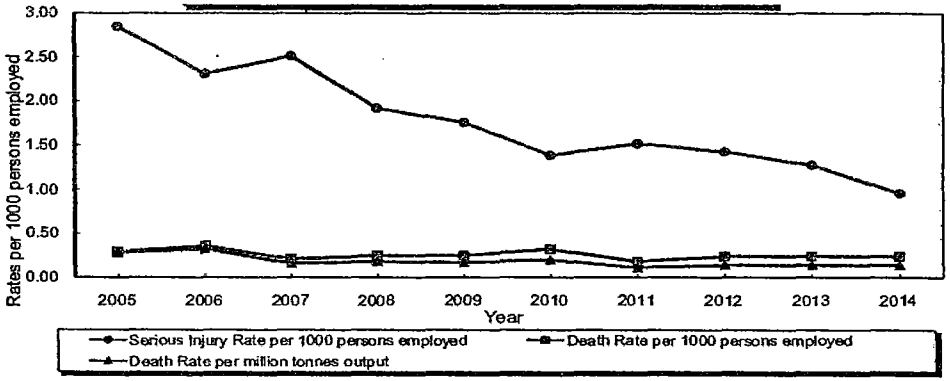
Cause-wise distribution of fatal accidents in coal mines during 2014.



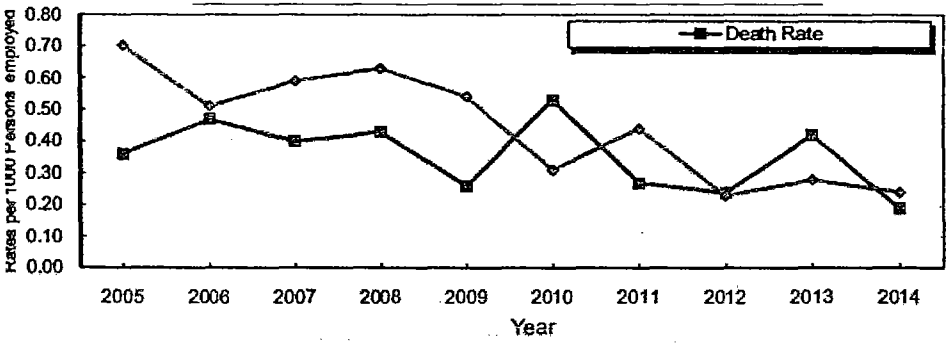
Cause-wise distribution of fatal accidents in non-coal mines during



Trend in Death Rate, expressed as per 1000 persons employed for coal and non-coal mines from 1901-10 to 2011-14



Trend showing death rates and serious injury rates in Coal Mines



Trend showing death rates and serious injury rates in Non-Coal Mines during 2005 to 2014

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